Planes of the USAF . . . Photos, Speed & Spec

SKYWAYS

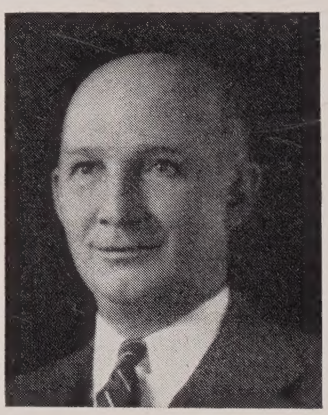
25¢

At Newark Airport the Celanese DC-3 heads for the Esso Sign...

When the Celanese Corporation of America's DC-3 comes in to the Newark, N. J., Airport, the ship generally points in the direction of the winged Esso Oval at Newark Air Service, Inc. Chief Pilot Howard Zbornik and Pilot Clint Housel are accustomed to the expert service and high-quality Esso Aviation Products which have distinguished Newark Air Service for more than 20 years.

Long a familiar landmark at one of the nation's busiest airports, Newark Air Service is an approved CAA repair station, and a regular stop for hundreds of private flyers and executives who want to keep their planes ship-shape. Newark Air Service is open 24 hours a day and provides storage and outside parking facilities.

It is a tribute to Esso Aviation Products that Chief Pilot Zbornik keeps an eye out for the Esso Sign whenever he flies. With 17 years of extensive flying experience behind him, he is a good judge of the quality of aviation fuels and lubricants. And Mr. Zbornik's judgment is shared by many leading airlines, aircraft and engine builders, who make Esso Aviation Products their first choice.



Taking time out for a relaxin chat while the DC-3 is bein refueled with Esso Aviatio Gasoline are (l. to r.) Howar Zbornik; Celanese Corporatio of America's Chief Pilot; Clin Housel, Pilot; and Chuck Ne son, Hangar Manager of New ark Air Service, Inc.

C. J. Strickland, President Newark Air Service, Inc.

ESSO

AVIATION PRODUCTS

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Penna., Ohio, Del., Md., D. C., Va., W. Va., Ky., N. C., S. C., Ga., Fla., Ala., Miss., Tenn., Ark., La., Texas.

ou CAN BE SURE.. IF IT'S

Westinghouse

ese leading U. S. Air Force PENETRATORS are POWERED by Westinghouse

Being penetrators, these planes must carry out tactical missions deep into enemy territory. To provide the required fuel economy and dependability, Westinghouse J-34 turbojets have been chosen for their power plants.

Westinghouse is constantly striving for improvement in jet propulsion . . . to provide only the best for the United States armed forces it is privileged to serve.

J-54002-B

Westinghouse

AVIATION GAS TURBINES

America is discovering a

Far from being just another gadget, the Lear L-2 autopilot is a device that is radically altering the fundamental nature of flying itself. Here are the impressions of prominent pilots who have tested the L-2. Here are the *facts*—as told by a few of the many owners who now fly with the L-2 autopilot day after day in their own planes . . .

"Greatest Contribution Since Airplane Was Invented"

I operate the L-2 under all conditions, and I wish to say that it is man's best friend in marginal weather. It eliminates everything undesirable in rough air flying and maintains perfect course under all conditions. The L-2 autopilot is one of the world's greatest contributions towards flying and navigation for the average private and executive pilot since the invention of the airplane. It definitely increases the safety of flying due to its all-weather performance. It definitely reduces time between two points on cross-country due to a true course under all conditions. It definitely increases the smoothness of the ride in rough air due to perfect attitude at all times, arriving at your destination free from tiredness and mental strain. I would rather quit flying than do without it. (Cessna 195)

CLARENCE E. MORRIS
National City, California

"Airman's Dream Come True"

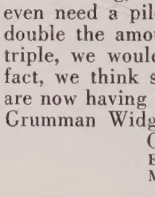
In rough air the L-2 autopilot's performance is uncanny and is probably its greatest advantage next to its aid in instrument flying. A child can learn to operate it immediately. There are only two knobs to turn—one to bank right or left and another to nose up or down. That is all there is to it. The L-2 autopilot is the airman's dream come true. (Navion)

L. D. ORMSBY
Ormsby Chevrolet Co.
San Antonio, Texas

"Now we can fly 12 hrs. a day"

Before the L-2, when we flew three or four hours on instruments, it was enough, and we would put the airplane away for the day because instrument flying is very tiring when there is no relief pilot. However, now we can fly eight, ten, or twelve hours a day, and the L-2 is our relief pilot. The L-2 actually makes a co-pilot unnecessary, and, in fact, if it weren't for take-off and landing, our airplane wouldn't even need a pilot. If we were offered double the amount of money, or even triple, we would not sell our L-2. In fact, we think so much of it that we are now having an L-2 installed in our Grumman Widgeon. (Bonanza)

CARL H. WAMSER
Everbrite Electric Signs, Inc.
Milwaukee, Wisconsin



"A Safety 'Must'"

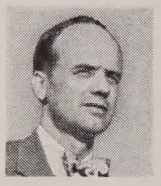
No private pilot need ever worry about weather if he has the Lear L-2 autopilot aboard. If he can read his compass, if he has sufficient strength to operate the turning knob, no sudden unexpected instrument condition can ever get him into trouble. The old rule about a 180 degree turn really means something now. In my book your autopilot is a safety "must." It will get you out of danger no matter how suddenly you run into instrument weather. It gives you time to think and to study your maps and check for a radio fix. It takes all the labor and worry out of flying. (Bonanza)

K. F. CLARDY
Lansing, Michigan

"Perfect Instrument Approach

My wife, who is normally allergic t gadgets in aircraft, put her immediat stamp of approval on the Lear L-2 auto pilot after the demonstration of its us in a GCA approach. She was amaze at what a perfect instrument approac could be made in an emergency wit the L-2 by a non-instrument pilot. How ever, what I appreciate most about th L-2 autopilot is the fact that with it th pleasure of flying will still be min when I would otherwise be quittin because of old age—say in about twent years from now. But with the Lea autopilot in my plane, I am sure that will continue to fly as long as I a physically able to drive a car. (Bonanza)

DR. JOHN P. LORDAN, M.I
Beverly Hills, California



"Takes Out All the Work and Leaves Only the Fun'

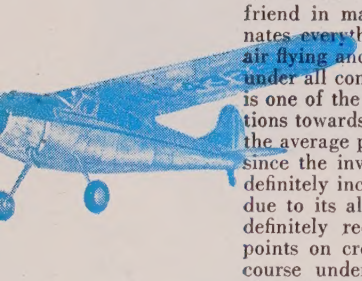
The L-2 takes all the work out of flyin and leaves only the fun. By holding a exact heading indefinitely it encou ages precise dead-reckoning and ad greatly to the pleasure of navigatio It permits in-flight study of maps, ai ports and radio facility data and fre the human pilot for calculating h flight plans and using his radio. B cause it removes the strain from cros country trips, I would judge that doubles the efficiency of the owner, h airplane and his other equipmen I consider it the greatest single cont bution to private flying in recent yea (Bonanza)

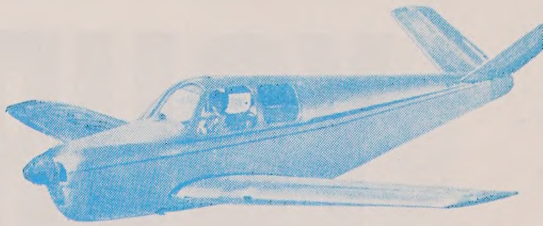
CARLETON PUTNAM
Chairman of the Board
Chicago & Southern Air Li

"Wonderful Performance"

The L-2 pilot gives a wonderful pe formance for such a small and simp unit. The freedom it gives the pilot du ing instrument flights is very importa when operating without a co-pilot. W feel that we have made a good inve ment in safety and convenience. (Tw Beech)

HARRY F. WHITE
Union Cutlery Co., I
Olean, New York





emarkable *new kind* of flying...

"I No Longer Hesitate to Fly Anywhere . . ."

Lear L-2 Pilot can hold a course itely, indefinitely, such as no pilot o even if he has a co-pilot to do e navigating for him! It leaves nands free to twist dials, throw es, futz with the carburetor heat, the radio, study the charts, figure TA's with the confusers, etc. As s my ceilings enroute and at the of destination are such as to give ne to hunt a landing field in case emergency, I no longer hesitate anywhere in my Lear equipped n through fronts, crud, crap and ave-you, except ice and thunder-, of course. I do most sincerely e that the Lear L-2 Pilot, the Omni-Range Receiver, and the ADF are the three greatest con-ons to private flying since the n itself!

ARTHUR GODFREY, CBS

e Super-Coordination"

ear L-2 autopilot is simply out of rld in what it does for a private irplane. It will not only fly the ne, but it will give your favorite ne stability and riding qualities ou've never dreamed of because never seen one flown well enough duce this almost eerie product of coordination. It not only gives a comfortable ride, but it takes the e out of piloting and you arrive as s your passenger. And if, enroute, ally need to deliver your very best ent on a weather or navigational m, it gives you an opportunity k, for it puts into the airplane a ss quality: a desire to fly straight.

LEIGHTON COLLINS
Editor, AIR FACTS Magazine

"Definitely Superior to the Drive-in Theatre"

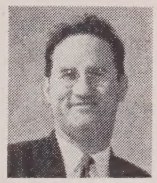
The L-2 autopilot is the greatest invention since one-armed driving was introduced. With television added to the omni, it is definitely superior to the drive-in theatre. (Cessna 195)

ELLIOT W. SPRINGS
President, Springs Cotton Mills
Lancaster, South Carolina

"Better Than an Airline Captain"

The L-2 pilot does a better-than-human job of flying in turbulent air. It is in rough air that the full enjoyment of the Lear L-2 Automatic Pilot can be seen. Long trips are now as comfortable as short ones formerly were. And how that L-2 pilot smooths out the bumpy roads and detours better than an airline captain! I wouldn't be without one now. (Cessna 195)

A. W. FREDERICK
Memphis, Tennessee



"The Missing Link"

It may well be that Bill Lear (AOPA 6975) has contributed one of the most important missing links to the development of private flying. It is quite conceivable that the L-2 right now could very well boost the average utility of a plane owned by a typical AOPA member from, say, an average of 50% to something like 90%. Such an increase in utility could, by itself, put civil aviation in the position of being one of the nation's healthiest, more thriving industries.

MAX KARANT
Editorial Director
Aircraft Owners & Pilots Assn.

"Increased the Airspeed Up to 15 MPH"

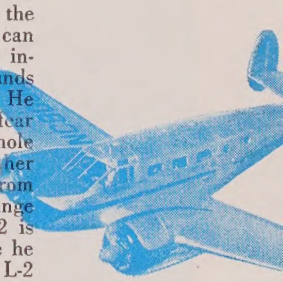
Slow flight down to 65 mph can be maintained with the L-2 autopilot so long as the prop turns up about 2000 rpm. The L-2 autopilot has increased the IAS from 10 to 15 mph (depending on altitude) due to the fact that it will hold the ship on the step perfectly, which is something that I am too lazy to do for any length of time. In short, I think the pilot is great and would not be without it. (Navion)

H. R. ELDRIDGE
Austin, Texas

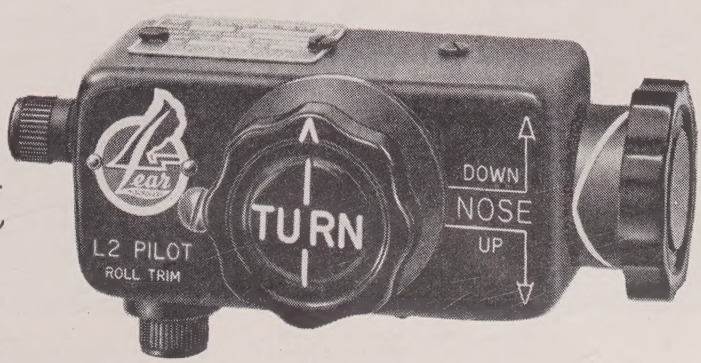
"Will Never Have Another Plane Without It"

It is my opinion that the L-2 autopilot is the most outstanding contribution towards the safety and enjoyment of light plane flying ever made. When visibility is very low and most of your attention must be directed outside the plane the L-2 is invaluable. I also can visualize the great comfort to the inexperienced pilot, who suddenly finds himself in instrument conditions. He turns on the autopilot, and without fear of losing control, can devote his whole attention to getting out of the weather and returning to where he came from or contacting his nearest radio range for help and advice while the L-2 is holding any course or any altitude he desires. Our experience with the L-2 has been so satisfactory that we will never have another plane without having it equipped with an autopilot. It's the best life insurance you can buy. (Bonanza)

GEORGE V. KEITH
Milwaukee Crane & Service Co.
Cudahy, Wisconsin



e LEAR L2 autopilot



SKYWAYS

Cover: North American F-86 *June, 195*

J. FRED HENRY . . . Editor and Publisher
D. N. AHNSTROM . . . Managing Editor DON DOWNIE . . . . . Western E
CHARLES W. ADAMS . . . . Art Director STANLEY M. COOK . Production Man
ANNE MASCHKE . . . Asst. Art Director ARTHUR KAPLAN. Circulation Mgr. (Newsst
BENNETT H. HORCHLER . Advertising Director A. E. CARDWELL . Circulation Mgr. (S

JUNE 1951 VOLUME 10, NUMBE

J. Fred Henry Publications, Inc. publishes SKYWAYS at 444 Madison Avenue, New Yor New York. Advertising Offices: 444 Madison Avenue, New York 22, N. Y.; 6 N. Michigan A Chicago 2, Ill.; 816 W. 5th Street, Los Angeles 13, Calif. Gordon Simpson, West C Manager. William H. Thomas, Chicago Manager.

The following publications are combined with SKYWAYS: Air News and Flying Sports

Vol. 10, No. 6, June, 1951, SKYWAYS is published monthly by J. Fred Henry Publications, Inc., 444 Madison Ave., New York 22, N. Y. Printed in U.S.A. Single copy 25 cents. Subscription Prices: U. S., possessions, Canada and Pan-Am. Union $7.00 for three years, $5.00 for two years, $3.00 for one year; all other countries add $1.50 per year for postage. Six weeks required for address changes (give both old and new address.) Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited materials. Reentered as second-class matter April 16, 1948, at the post office at New York, N. Y., under the act of March 3, 1879.

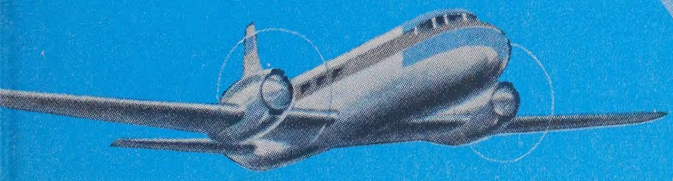
FOR THE AIRLINES *Convair 340*

An advanced version of the incomparably dependable Convair 240, America's newest luxury airliner, the Convair 340, with every travel convenience for 44 passengers, is the largest and finest twin-engine transport ever ordered for airline service.

FOR THE MILITARY *Convair T-29*

World's first navigator-bombardier trainer providing instruction and experience for relatively large groups of students, the Convair T-29, U. S. Air Force version of the Convair-Liner, is a significant contribution to America's rapidly expanding air power.

FOR THE FUTURE *Convair-Turboliner*



The sturdy and efficient Convair-Liner airframe has demonstrated complete adaptability to the installation of gas-turbine power plants. America's first turboprop transport, the Allison Convair-Turboliner, already has accomplished a series of successful test flights.

IN THE AIR -- IT'S *Convair*

CONSOLIDATED VULTEE AIRCRAFT CORPORATION SAN DIEGO, CALIFORNIA FORT WORTH, TEXAS

AIR YOUR VIEWS

Gentlemen:
In your May issue, you state "The Navy has ordered a substantial quantity of Chance Vought F7U-3's." In your August issue, you designate the *Cutlass* as F7U-1. I am interested in planes and would like to know which is right.

T. L. GAILLARD, JR.
North Branford, Conn.

Both, Mr. Gaillard. The Cutlass *that was a part of the Air Navy at the time that Special Section was put together, was the F7U-1 powered by Westinghouse J-34 turbojet engines. The next production model of the* Cutlass *was the F7U-2 powered by two Westinghouse J-46 jet engines. This version had drop tanks to increase range. A newer and even further improved version is the F7U-3, the production order for which was reported in SKYWAYS May issue.*—ED.

Canberra Specs

Gentleman:
Would you please give me the specs on the British *Canberra* bomber that we may soon get from England in exchange for our F-86's?

G. T. JEFFORDS
Vallejo, Calif.

At this time, Mr. Jeffords, the only specifications that are not classified are reported in this issue, page 29 in the U.S. Air Force special section of aircraft.—ED.

Future Pilot

Gentlemen:
I am 16 years old and my ambition is to become an Air Force pilot. I know that to become a pilot requires a lot of hard work and study. Could you suggest some books or information that would help me get ready for a career as a pilot?

A. M. SHELAMER, JR.
Florence, Ala.

Our suggestion is that you contact your local Civil Air Patrol in Alabama, and investigate becoming a CAP cadet. You'll learn plenty as a cadet and it's probably the best background for flight training we know of. As to books, there are many: "Stick and Rudder," by Wolfgang Langewiesche is excellent; so is "Learning to Fly," by Bert A. Shields. You could also get a head start in your ground school work by writing to the Government Printing Office for a list of CAA aviation manuals. Pick out the ones you want and send for them. If you are interested in the Civil Air Patrol, write to Col. Wm. S. Donovan, Bldg. T-390, Birmingham AFB, Birmingham, Ala.—ED.

Paging Lt. Seibert

Gentlemen:
It was with great pleasure that I read "Forced Landing" in your April issue for it confirmed my opinion of Lt. Seibert.

On January 10, 1948 I was a member of a crew that went into Edmonton on temporary duty. While there word was received that this same Airways and Air Communications Station at Cambridge Island had practically no fuel remaining for heating purposes. Lt. Seibert was chosen to supply them. Believe me, I was worried for the ice was reported to be in very poor condition. Regardless, Lt. Seibert took a loaded C-54 in and out safely.

In my opinion he is one of the greatest pilots of all times.

W. T. CANTRELL
Syracuse, N. Y.

We go along with you, Mr. Cantrell, and agree that Lt. Seibert is a wonderful pilot, and we thank you for adding to our information regarding the able airman.—ED.

Andrews AFB, not Drews

Gentlemen:
Isn't that picture on page 31 of the May issue of the British *Canberra* taken at Andrews AFB instead of Drews AFB?

SGT. R. F. PRXYBYCIN
Andrews AFB
Washington, D. C.

Could be. The news service that supplied the photo captioned it "Drews AFB, Md." It should have read "Andrews AFB" . . . our apologies.
ED.

Homemade Steering Bar

Gentlemen:
I noticed on page 52 of the May issue that Mr. B. Blatt introduces a steering bar for the *Ercoupe* similar to one that has been marketed by us since 1947. He recommends that these bars be homemade with a 4½-foot handle. We had a series of control failures in 1946, traceable to such homemade bars because they were made too long and heavy to permit the user to feel the control stop and thereby permitted them to damage the control system or the stop without realizing it in the process of handling the airplane. It was this which prompted us to manufacture our bar which is, by the way, adaptable to either the 5.00 x 4 or 5.00 x 5 nosewheel. Our bar lists at $5.00. I would strongly recommend that anyone making up his own bar limit the handle to three feet in length and use lightweight tubing rather than pipe or heavy tubing.

R. SANDERS
Sanders Aviation Co.
Riverdale, Md.

Being a distributor for Ercoupe, *Mr. Sanders should know. Thank you, sir, for your letter. Your suggestion undoubtedly will save on the maintenance bills of those plane owners planning to make their own steering bars.*—ED.

Air Races

Gentlemen:
Because of my interest in the air races, I would like to know whether or not they will be held in Cleveland this year. If they will not be held in Cleveland, where will they be?

F. COOKE GOFFIGO
Cape Charles, Va.

According to our last communique, there will be no National Air Races this year in Cleveland. We still have no definite word regarding the possibility of there being held someplace else. Much seems to hinge on whether or not the military can take part in such an air show.— ED.

B-36 Engine Repair

Gentlemen:
According to a manual I have, the wings of the B-36 are seven and a half feet thick at the center which allows a mechanic to repair engines during flight.

This bit of information might answer the question of Pfc. Gazalla of Westover AFB, Mass. who asked about B-36 engine repair in flight in your Air Your Views for April.

V. DIETZEL
San Antonio, Texas

Thank you, Mr. Dietzel, for your interest and info.—ED.

3,500 HORSEPOWER PLUS... also

.39 lb. per h.p. per hr.—fuel consumption at cruise power

1 horsepower PLUS per lb. of weight with exhaust system

18 cylinders that operate at only 43% of power at cruise

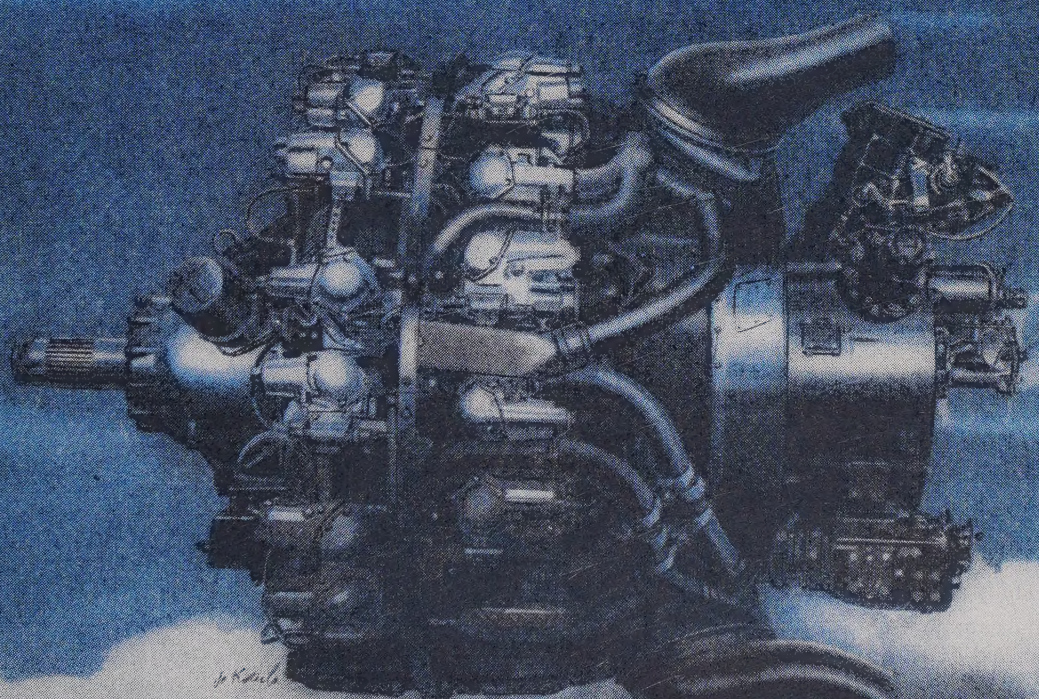
1 horsepower PLUS per cu. in. of displacement

Short, stiff crankshaft, one piece master rod bearings

Rugged steel crankcase for reliability and lower maintenance cost

Balanced air distribution plus fuel injection for longer valve, piston and plug life

Single lever throttle control—no power controls required



Turbo Compound

WRIGHT The World's Finest Aircraft Engines

NAUTICAL CORPORATION
RIDGE, N. J. • A DIVISION OF CURTISS-WRIGHT

MILITARY AVIATION

Combat Hours

A four-plane *Thunderjet* close-support mis sion in the Taemi-Dong area marked th 10,000th combat hour for the 27th Fighte Escort Group. The hours were piled up i just two days under a three-month perio Led by Lt. Col. Wm. E. Bertram of Chicag Illinois, the *Thunderjets* attacked enem troops and machine gun positions outsid Taemi-Dong. Number 2 position was flow by Maj. A. W. Fell of Lewis, Kansas; Nun ber 3 was Lt. D. J. Bush of Fenton, Mich gan; and Number 4 was Capt. Bill Manaha of Pigeon, Michigan. The 10,000 hours repr sent some 4,765 combat sorties by *Thunde jets* since the initial F-84 mission last D cember 7. To date, the '84's claim fi MIG-15's destroyed, one YAK destroyed an nine MIG's damaged in air-to-air comba Four *Thunderjets* have been lost, but onl one in air-to-air combat. The 27th Fighte Escort Wing Commander is Col. A. B. Pac ard, of Douglas, Arizona.

USAF Canberra

The English Electric twin-jet light bomb and intruder plane is to be built in this cou try by Glenn L. Martin Co., Baltimore, Mar land. The Air Force designation will B-57A. The British are expected to buy quantity of F-86 *Sabres* for the RAF, a d cision which was made, according to repo after the *Sabre* out-matched an RAF *Va pire* and *Meteor* in a secret "air battle."

McCulloch MC-4

A new entry in the helicopter field is t two-place tandem-rotor MC-4 helicopter d veloped by McCulloch Motors Corp., in Ca fornia. The new 'copter made its first flig in April. The Navy has placed an order wi McCulloch for an MC-4 for evaluations tes Features of this new helicopter are: contr stability, absence of vibration resulting simplified piloting, and low production cos The civilian version of the MC-4 is design for crop dusting, pipeline patrol, forestry p trol, etc. The 'copter uses 165-hp Aircool engine.

Traffic Control Monitor

A new automatic traffic control monitor, joint project with Watson Laboratories a the USAF, by Gilfillan promises to ma possible faster take-offs and landings duri low-ceiling conditions. Coupled with PAR (Precision Approach Radar), the traffic co trol monitor keeps track of three plan simultaneously from 10 miles out to tou down. It indicates: position of each plan approach speed; gives light and bell wa ing of the over-take of any of the three plan at any pre-determined safety spacing; gi aural and visual warning if the pip of t plane being tracked is lost for more than seconds; and advises personnel when near aircraft is pre-determined distance from touch-down.

MEN OF THE HOUR

Embry Riddle

are moving UP!

Thousands of Embry-Riddle trained engineers, mechanics, specialists and pilots are making rapid strides in today's booming aviation industry. You can join them, *now!*

Men in the top jobs now, who are moving up...up...up...are undeniably proving that thorough, practical Embry-Riddle training is by far your quickest, surest road to success in aviation. Complete eight-month to two-year Embry-Riddle courses in every phase of aeronautics are tailored to the practical and exacting aviation industry requirements. Your Embry-Riddle graduation certificate insures your career opportunity.

The latest, most modern equipment (including jet engines), the finest instructors, the most complete aviation school campus anywhere, are all yours at Embry-Riddle. You learn fast and well, working with live aircraft in vast shops and hangars.

If military service interrupts your studies, you're still a long way ahead of the crowd. During World War II, more than 30,000 pilots, technician and mechanics of the air forces were Embry-Riddle trained!

If you are now a high school student, a graduate or a veteran, investigate at once the full advantages and tremendous career security of Embry-Riddle training. Join the Embry-Riddle Men of the Hour. Write for full information today.

4 Keys to Success!

1 AIRCRAFT & ENGINE MECHANICS

Vast numbers of *properly trained* A&E Mechanics are urgently needed. Our C.A.A.-approved school with a quarter-century experience assures your quickest advancement. Embry-Riddle students learn fast with modern equipment, including jet . . . live aircraft, airline-size hangars.

2 A&E COMBINED WITH COMMERCIAL

Airmen with *dual* pilot-engineering ability are needed by aviation companies and operators. Embry-Riddle *combination* training offers you the most in your aviation career.

3 AERONAUTICAL DESIGN AND TECHNOLOGY

Embry-Riddle's accelerated 26-mo. Aeronautical Design and Technology Course provides finest training available. Technicians with management responsibility enjoy highest salaries!

4 COMMERCIAL PILOT

Embry-Riddle trained pilots benefit from our years of experience with 30,000 students... the best instructors, up-to-date aircraft, superb year-'round flying weather. Also Instrument and Instructor's ratings.

CLASSES BEGINNING NOW -- SEND COUPON TODAY!

Dean of Enrollments -- Dept 93
Embry-Riddle School of Aviation
MIAMI 30, FLORIDA
Please Print

NAME _____

ADDRESS _____

City _____

State _____ Age _____

I am interested in...

- ☐ A.&E. Mechanic
- ☐ Commercial Pilot
- ☐ Aeronautical Design and Technology
- ☐ A.&E. Combined with Commercial Pilot
- ☐ Flying Mechanic

Check One ☐ Veteran ☐ Non-Veteran

Embry Riddle
International
SCHOOL OF AVIATION
MIAMI 30, FLORIDA

TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

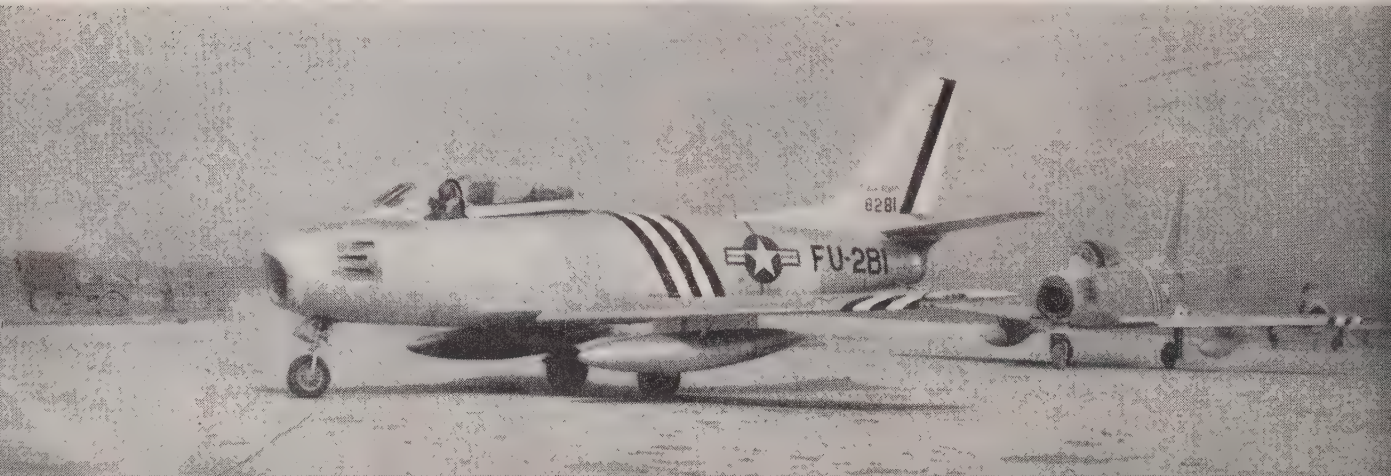
SABRE heads home after strike at enemy in Korea. Thus far F-86's have proved their superiority over the MIGs

"KILLER" JET IN KOREA

By GILBERT C. CLOSE

The stage for a new phase in aerial combat was set early in the morning of December 18, 1950, when Lt. Col. Bruce H. Hinton, Stockton, California, of the Air Force's Fourth Fighter Group, slipped into the cockpit of his F-86 *Sabre,* taxied down a South Korean airstrip, then pulled into the air with three more jet *Sabres* dogging his wing tips. This was the first reported combat mission of one of the world's fastest operational airplanes. A lot hinged on the outcome of that flight. If MIG-15's were encountered, how would the *Sabres* fare against the sinister fame of its Russian counter-

FIFTH AIR FORCE *Sabres* land on a Korean airstrip near the forward area and in better position for flying against enemy targets. In one air battle 15 *Sabres* were attacked by 40 MIGs, but F-86's sent MIGs scurrying home

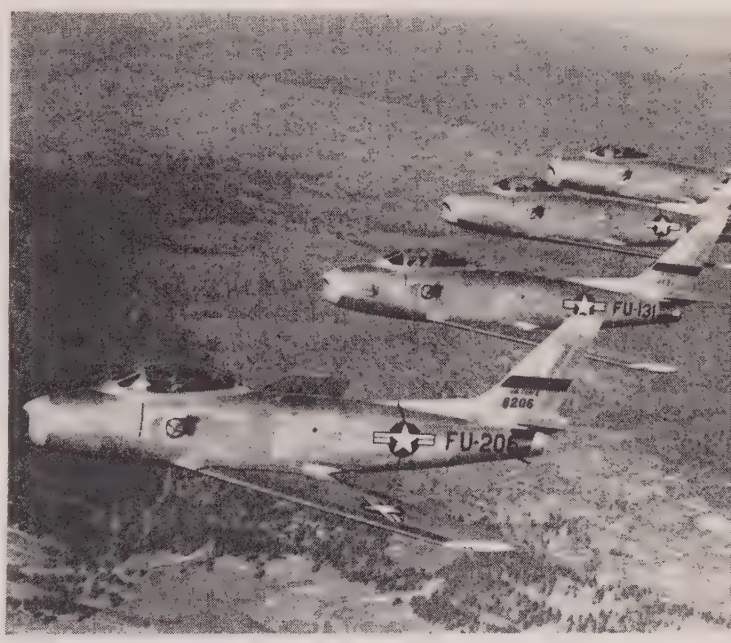


USAF SABRE, designed and built by North American, has proved itself to be one of the best in jet fighter field

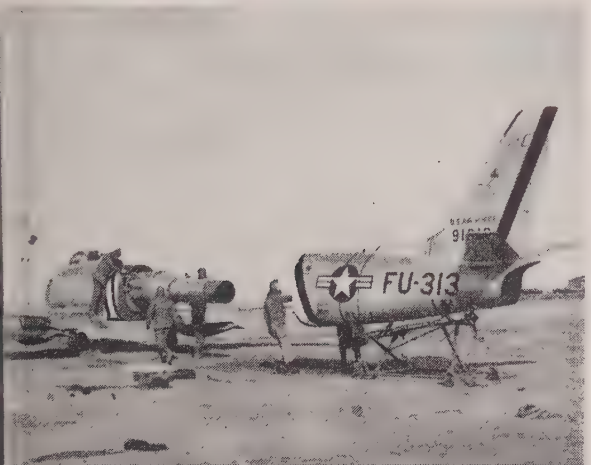
part? Would the hoped-for U. S. superiority reign.

The answer came with stunning swiftness. In less than an hour, some 10 miles south of Sinuiju in Northeast Korea, Hinton let loose with the six .50-cal. machine guns in the nose of his *Sabre* and hammered a MIG deep into the mire of the North Korean rice paddies. Three other MIGs that had come up to do battle with the four *Sabres* took the hint and went home fast to their political sanctuary behind the Yalu River.

It was all over in five minutes, but some important questions had been answered. The *Sabres* were faster than the MIGs. The *Sabres* could turn inside the MIGs. These facts later added up to a lot of



MECHS in Korea (*below*) separate *Sabre* fuselage to work on the *Sabre's* GE J-47 engine. Ease of maintenance is a feature of the F-86; another feature is its ease of control, even further improved in the latest F-86E *Sabre*



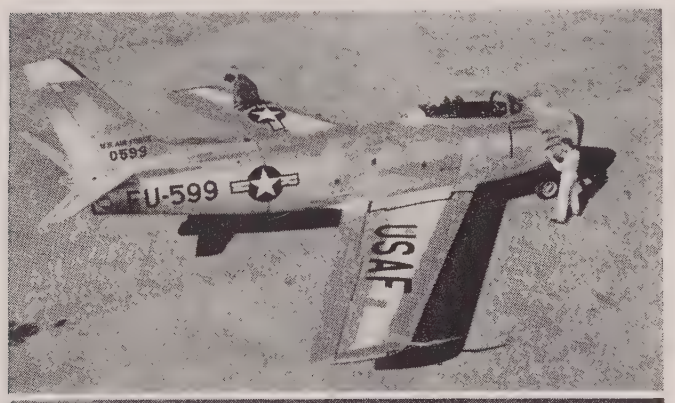
victories for *Sabre* pilots with the guts to pull a quick turn, then level and shoot while traveling somewhere in the supersonic velocity ranges.

"We had to suck those guys into the fight," Col. Hinton explained later. "We did it by flying at slow speed over the area frequented by the MIGs. We wanted to look like an easy kill."

The *Sabres* were at 25,000 feet, the MIGs about 15,000 feet lower when (*Continued on page 12*)

ARMAMENT on the *Sabre* includes six 50-cal. machine guns in the nose. Racks under wings carry 16 five-inch rockets

LINED UP and ready to take off for combat against Chinese Reds, these F-86's were based in Japan; are now in Korea



the dogfight began. When the *Sabres* dived, the MIG pilots started into a hard turn, but the *Sabres* turned inside them. The Red pilots, realizing that competition was getting rough, jettisoned their wing tanks. Hinton shucked his own tanks and centered on a MIG for his target. He squirted once with his six .50's and watched pieces of the MIG fall away. The Red pilot dropped his brakes, then pulled them in again. Hinton squirted once more—a long burst this time—and the MIG went down in flames.

Bolstered by this first quick victory, Col. John C. Meyer, Group Commander, gave vent to the enthusiasm he had been feeling ever since he first flew a *Sabre*—"It's just the finest airplane I ever saw or flew. It's everything good wrapped up in one fast package. It's even nice to taxi and nice and warm and comfortable to sit in. It has all the little things as well as all the big ones!"

The *Sabres* entered the Korean conflict with a hard-won reputation to maintain against unknown odds. It was known to be fast and pack a lot of fire-power wallop. It handled like a dream in training and during mock air battles. But the MIG-15's had a reputation that had filtered through the Iron Curtain. Furthermore, the MIGs were as near a duplicate of the *Sabre* as "inventive" Russian brains could make them.

Our only direct acquaintance with the Russian-made jet came from study of a MIG-9 that had crash-landed in Sweden without serious damage to the airplane. This MIG carried two 23-mm guns and one 53-mm gun, and intelligence experts rated it as unexcelled in speed and rate-of-climb. It was generally believed that the MIG-15, a direct lineal "descendent" of the MIG-9, (*Continued on page 46*)

EXTRA FUEL TANKS are mounted inboard under each wing of the *Sabre*; are designed to comply with contour of plane

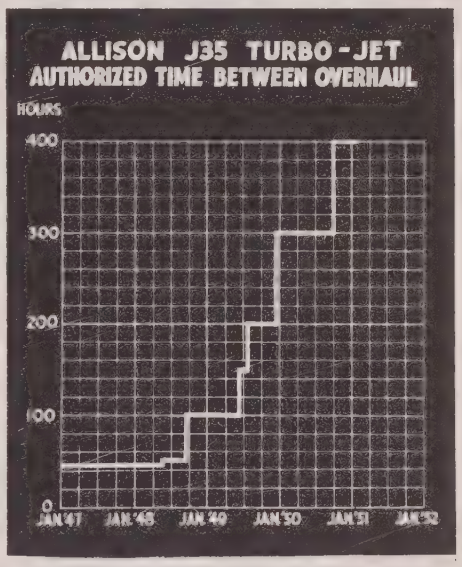
STRATOJET, the Boeing B-47, is powered by six GE J-47 turbojets. Prototype of YB-47C will be powered by four J-35-A-23's

U.S. SUPER JET

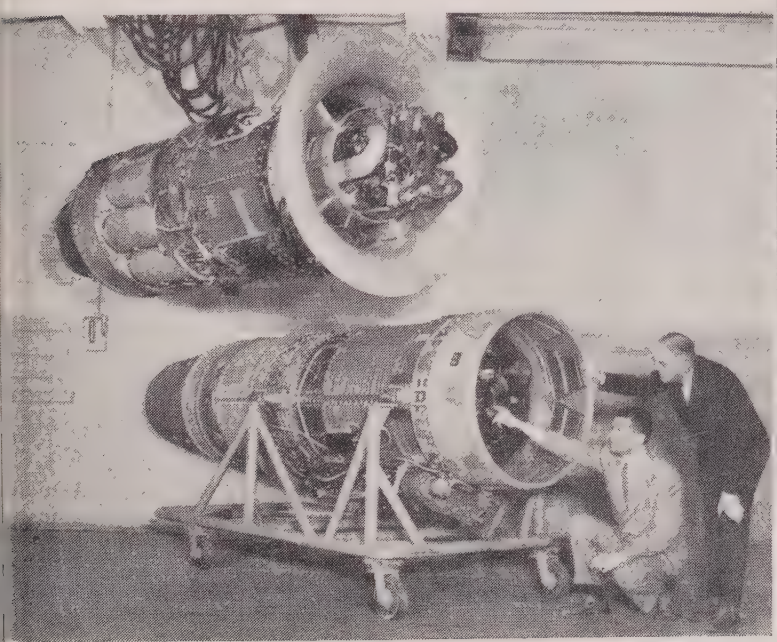
The Allison Division of General Motors has announced production of its newly developed J-35-A-23 turbojet, claimed to be "most powerful jet engine under contract for production." This announcement of the J-35 was made at the same time Allison announced it recently had delivered its 10,000th jet engine to the military.

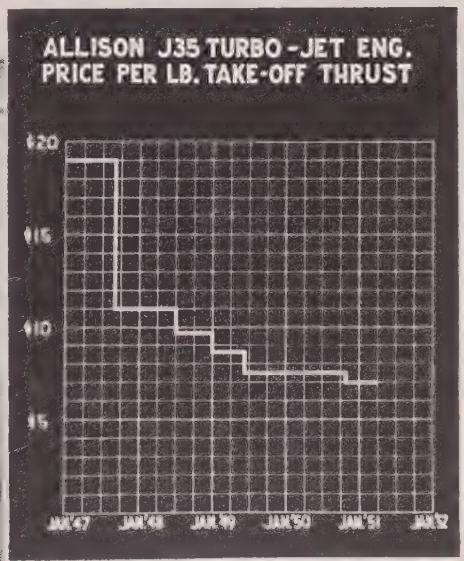
The J-35-A-23 has been rated at "over 5200 pounds thrust." However, its actual rating is thought to be in excess of that, probably nearer 9,000 or 10,000 pounds.

The new J-35-A-23 turbojet has been accepted for use in the prototype of the Boeing YB-47C which is expected to fly later this year. Instead of six J-47 turbojets which currently power the B-47A, the YB-47C will be equipped with four J-35-A-23's which, according to company report, "will deliver a great deal more power than the B-47 is currently getting from its six engines."



SUPER JET J-35-A-23 *(below, right)* is similar in engine diameter to J-35-A-17 *(below, left)*, but it is a much more powerful turbojet





CHARTS show improvement in J-35-A-17 jet since January, 1947. Overhaul time was every 50 hours; is now every 400 hours. The price per pound thrust has been reduced

PARATROOPER leaps from plane, followed by another, then another. Hands slapped across reserve chute, chin tucked in, he begins counting, "One thousand . . . two thousand . . . three thousand." By "three thousand" chute should be open

ONE thousand!

TWO thousand!

THREE thousand!

THIS was it . . . the moment a paratrooper waits for. The moment many of us had dreaded. In a few moments we'd be aboard the C-82's warming up on the airfield outside, bound for our first of five parachute jumps; the climax of two weeks of hard, rigorous training. During that time, we'd lost a good third of our class—men who dropped by the wayside because of injuries, transfers, lack of physical endurance, or just plain fright. Those of us who remained were tough and we knew it. But our first real jump lay ahead.

It's easy to understand the reason for the high *esprit de corps* found in the Airborne. After going through the most vigorous physical training the Army has to offer, we were proud of our unit and self-confident. We had trained until our bodies screamed for relief, and then we had trained some more.

As we stood there waiting to have our chutes checked, most of us were silent; a few were bois-

DROP ZONE ahead, troopers nervously await first real jump. Until now jumps were from mock-up

By ALLAN BUERGIN

terous and impatient, each wondering if the other were as nervous and scared as he, each wondering if he'd have the guts to go through the open door into space.

Then the order came. The sergeant pointed to our group. We shuffled out to the flight line, had our chutes checked again, then moved toward the waiting plane. Quickly, we were given our numbers in the stick and the door from which to jump.

Once inside the C-82, I looked around. So this was what it really looked like. I'd made so many "jumps" from a mock-up '82 I felt I could do it in my sleep. But this was strangely unfamiliar—there were so many other gadgets. There were oxygen outlets and other queer tubes and mechanisms on the bulkheads, and on the floor were rings for vehicular tie-downs and equipment. But overhead was the familiar anchor-line cable.

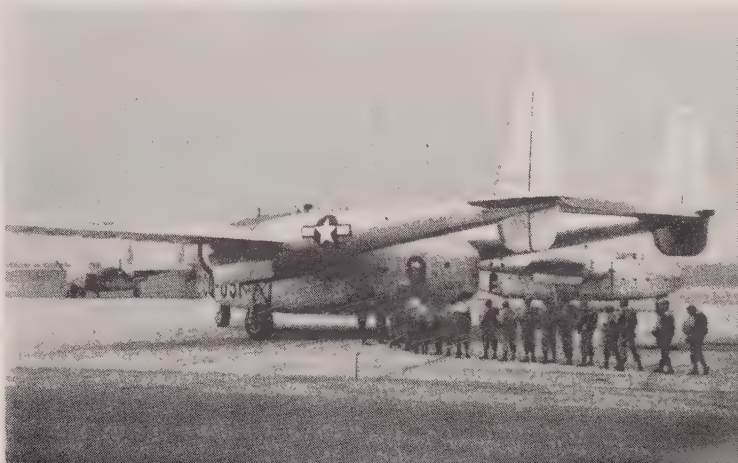
I connected my static-line fastener to the cable, the rest of the line trailing over my left shoulder down to the break-cord attachment to the bridal loop of my canopy apex. For a fleeting second I wondered if it would hold until my chute was completely out of the pack.

The jumpmaster called out something, but I couldn't hear him over the sound of the big C-82's idling engines. Everyone seemed to be fumbling their safety belts, so I tested mine, too.

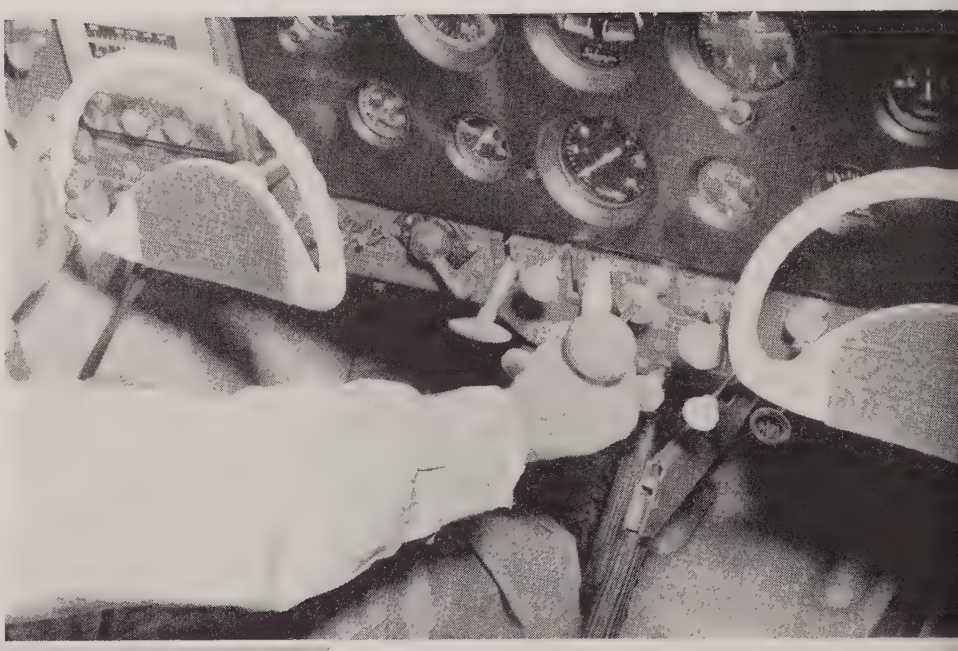
Then the pilot revved up the engines, the plane straining against its brakes, and we all listened intently for some sign of faulty operation. But the engines ran smoothly . . . and we were off down the runway, and airborne.

When we reached an (*Continued on page 54*)

PARATROOPERS file into C-82, bound for first of five jumps that climax two weeks of hard, rigorous training



TRIM TABS make XC flying easy. This pilot *(right)* is making elevator trim adjustment (left of the throttle) on a Ryan *Navion*



CONTROLS for trim in a twin-engine Cessna are located on roof of cabin. Pilot here makes rudder adjustment on Cessna

Trim Tabs Make Flying Easy

By WESLEY NEAL

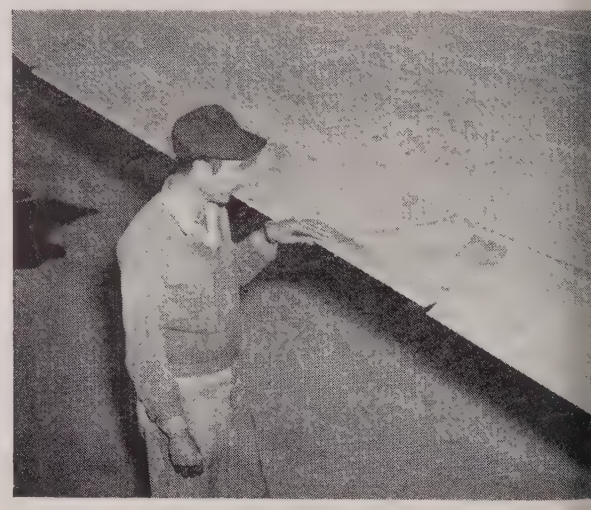
A PIECE of metal no larger than an ink blotter nearly cracked me up in a Carolina swamp.

I was flying along one night between Columbia and Florence, South Carolina. The plane's left wing seemed unusually heavy, but I blamed it on faulty rigging and blundered along, applying right pressure on the stick.

About half-way to nowhere, I bent down in the cockpit to check my map. When I looked up, the whole world had gone crazy. Orion had changed places with Sumter and Camden was trying to do a rumba around the North Star. I never saw so many lights in my life. And every one of them doing a mad whirling dance between earth and sky. Trouble was, I couldn't tell which was earth and which was sky.

Luckily, I managed to get straightened out. And then I discovered my trouble. Unconsciously, I had

AILERON trim tab on a Twin Beech gets a check from flight-line mechanic. A well-trimmed plane flies "'hands off"



been applying aileron pressure. When I looked at the map—Bingo! If I had only adjusted that little tab on the wing, everything would have been all right.

Small as they are, trim tabs can cause a peck of trouble and hard work—when improperly used. I knew a chap who flew from Atlanta to Indianapolis once and nursed back pressure on the stick all the way. When he landed, he told the mechanic, "I think there's sand in the tail of this thing." He'd simply forgotten to trim his elevators. In 1945, a South Pacific B-29 ran out of fuel and was ditched. An un-trimmed rudder had eaten up that margin of gasoline needed to get home.

From Maine to New Mexico and points in between I have talked to pilots who say, "I'd get a kick out of flying if it didn't make me so tired." Nine times out of 10 the trouble is poor trimming technique.

Most lightplanes now are equipped with trim tabs for each axis of the airplane: rudder tab for the vertical axis; elevator tab for the horizontal axis and aileron tab for the longitudinal axis. Usually, these tabs are controllable from the cockpit. But in some instances, the aileron tab is fixed.

When I began flying, my instructor cautioned me to learn to use the trim tabs. Evidently he was not impressed with my progress in this respect, so he chose to give me a lesson which I have not forgotten to this day.

We had been practicing a series of emergency procedures. He would put me into a stall or a spin and order me to recover. During one such maneuver, we had spun about two turns when he said, "O.K., pull 'er out."

I pulled the stick back in my stomach and gave her full rudder in the direction of the spin. Then I kicked opposite rudder and shoved the stick forward. As usual, we ended up in a steep dive.

When I started to pull out of the dive, I thought all the pixies in Pockalooka County had hold of the controls. Try as I would, I couldn't budge the stick. Down we screamed while I sweated and strained. Then I thought, this joker in the front seat is trying to pull my leg. How does he expect me to recover from this dive when he's holding the stick forward.

Just then I glanced up into the mirror. My instructor was sitting there with a grin on his face a yard wide. He squeaked through the earphones, "Why don't you check your trim tab?"

I reached down for the tab wheel . . . and felt like a fool. He had cranked the thing full forward. Instead of fighting him, I had been fighting air pressure.

Flying an un-trimmed (*Continued on page 48*)

RUDDER TRIM TAB also is looked over by the mechanic. This tab is on BT-13; is independently controlled by pilot

NAVION PILOT failed to properly trim his airplane, and end result was a very poor landing. Know your trim tabs

Airborne Genius

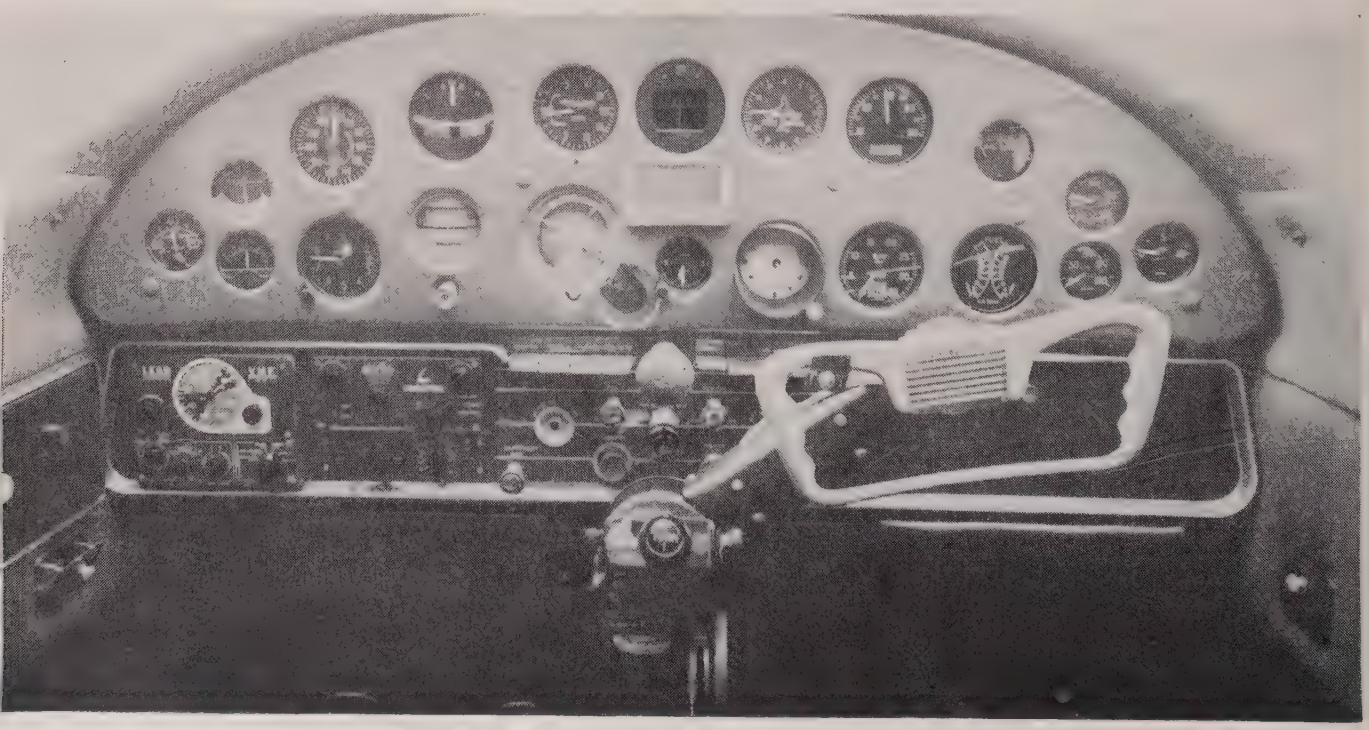
By HARLAND MANCHESTER

At an altitude of 8700 feet just west of Allentown, Pa., a fabulous character named William P. Lear, self-taught engineer and inventor, pointed his Twin Beech for Grand Rapids and flipped a switch on the control wheel.

"Now she's on her own," he said to me, grinning like a boy riding "no hands" on his bike. His latest invention, a bantam-weight autopilot which has made Bill Lear aviation's man-of-the-year, had taken over. For some time electronic robots have been used on big transport planes and bombers, but they are too heavy and bulky for small planes where every pound and every cubic inch count. Now, by a miracle of miniaturization, Lear has given to civilian plane and fighter flyers a silent co-pilot, relieving them of the constant strain which decreases alertness and paves the way for crashes. The Lear autopilot is on its way to revolutionizing private

BILL LEAR, aviation's man-of-the-year, won Robert J. Collier Trophy for his bantam-weight automatic pilot, the Lear F-5

INSTRUMENT PANEL on Lear's Cessna 195 shows Lear L-2 Autopilot control unit, Omnimatic, and the Lear Orienter



flying, and the Air Force has adopted it for jet aircraft.

Before Lear turned the switch, his Beechcraft had been riding the bumpy air like a car on a rough road—now, with not a finger on the controls, she plowed smoothly toward her goal. For nearly 600 miles, Lear let the device fly the plane. He studied charts, tuned in for weather reports, and relaxed. If a gust of wind tried to push down a wing, the uncanny robot scented the plot and foiled it within a hundredth of a second. Told to keep the plane at constant altitude, the 36-pound "brain" promptly put her back on the mark if the altimeter showed a deviation of as little as 10 feet.

For this invention, Bill Lear was named by the National Aeronautic Association as winner of aviation's most coveted award, the Robert J. Collier Trophy, given for "the greatest achievement in aviation in America during the previous year," and

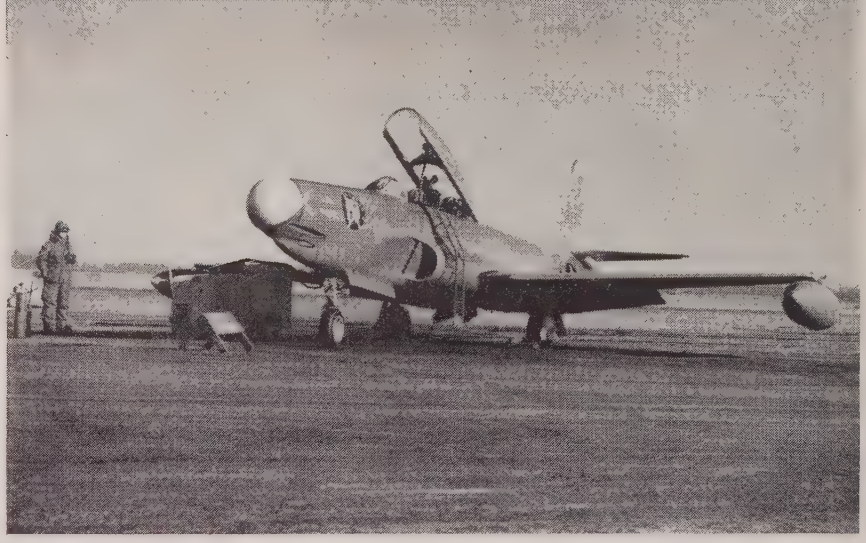
LEAR LODESTAR is equipped with wire recorder, loudspeakers at each seat, TV. Here, Lear points to the TV antenna

CESSNA 195 is a flying laboratory for Lear radio equipment and is used to demonstrate Lear products. Capt. C. Blair *(below, right)* had L-2 installed in *Mustang*. Bill Lear is here with Mrs. Blair, Mrs. Lear and Capt. C. Blair

previously conferred upon such giants of flight as Orville Wright, Glenn H. Curtiss and Glenn L. Martin. As described by President Truman in the White House ceremony, Lear won the award "for his development of the Lear F-5 Automatic Pilot and Automatic Approach Control Coupler System which makes possible the safe landing of jet aircraft regardless of weather or visibility conditions."

An appointment with a sirloin steak in Kansas City the following night gave Lear a sound reason for showing how his electronic robot brings planes in. Like most big airports, KC is equipped with ILS which may be visualized as a giant slide built of radio waves, down which a plane equipped with the proper radio gear may glide to a safe landing. Lear's Control Coupler Sys- (*Continued on page 52*)

ALERT!

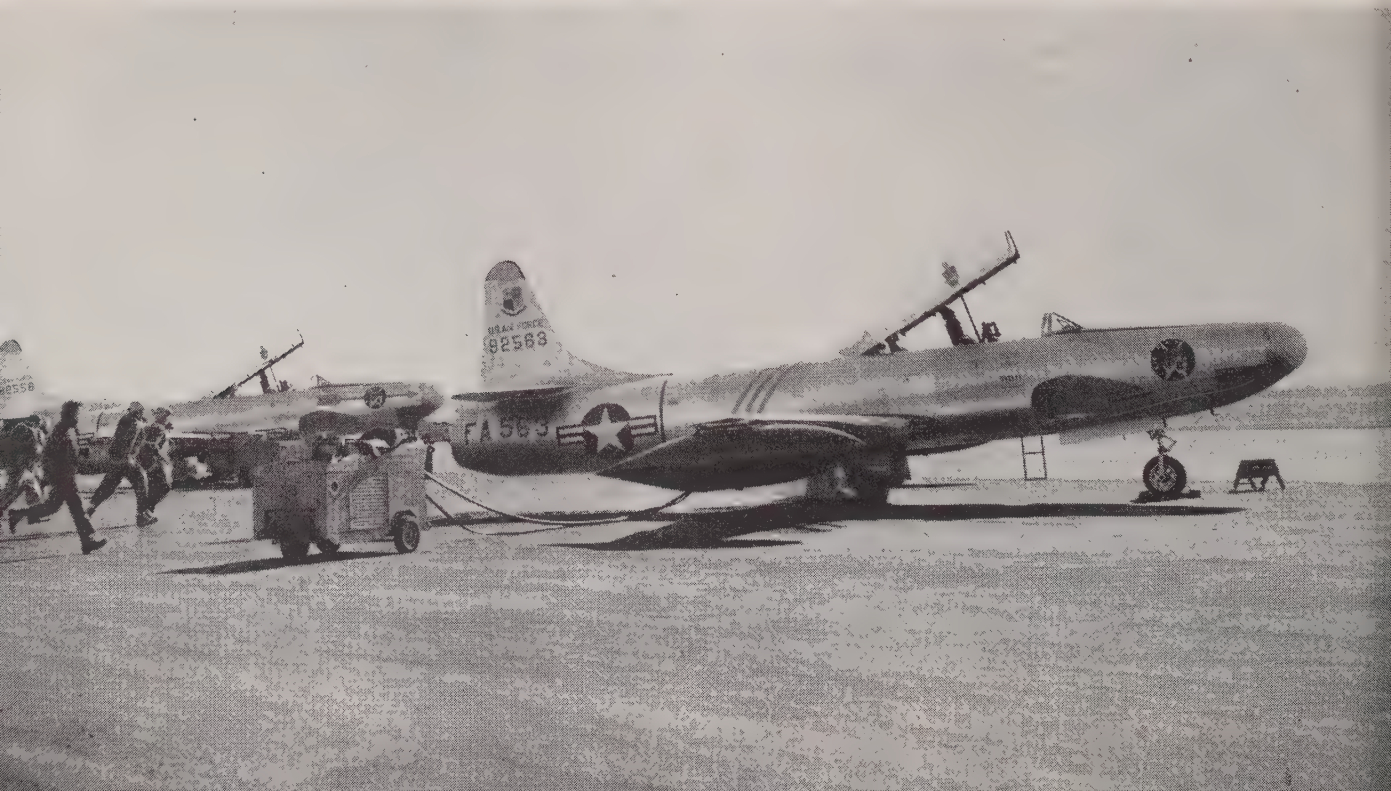


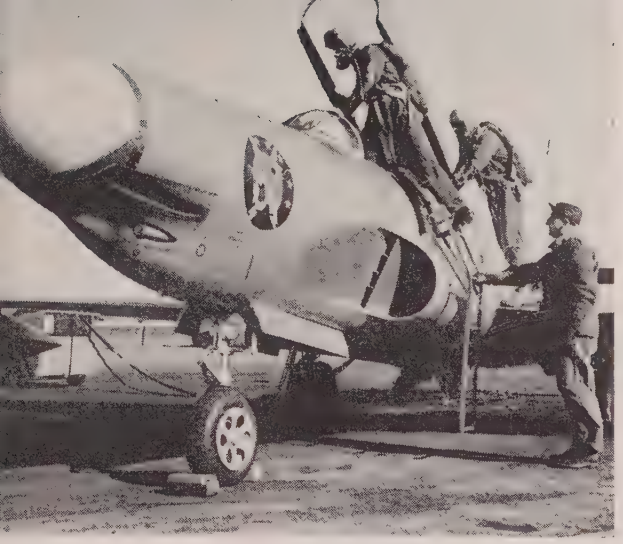
ALERT CREW *(below)* passes time playing cards. Men are always dressed for flight while on duty; are housed in trailer on flight line. Armed guard *(right)* never leaves "alert" plane parked near the field's active runway. Note "Hot Guns" sign

WITH the so-called Cold War growing warmer, New York and the Industrial East area of the United States is under a stand-by alert guard 24 hours a day by the 52nd Fighter All-Weather Group based at McGuire AFB, Wrightstown, N. J. Employing the new Lockheed F-94 jet interceptor, the 52nd Group is operating under the command of the 52nd Fighter All-Weather Wing. The F-94's are loaded with radar and can be flown in all kinds of weather day or night. Fitted with a Solar afterburner which boosts the static thrust of the J-33-A-33 Allison from 3900 pounds to more than 5200 pounds, the F-94 has a speed in excess of 600 mph.

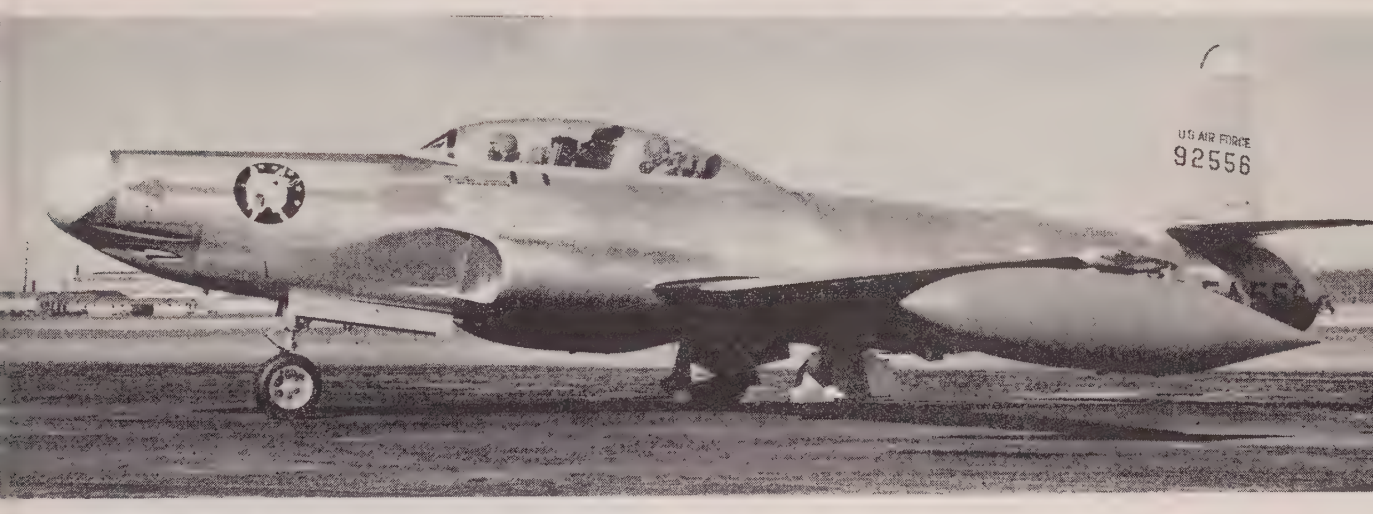
These photos illustrate the procedure used in watch-dogging the New York area in intercepting unidentified aircraft.

SCRAMBLE signal given, both flight and ground crews rush to nearby planes. F-94's are fully armed and energizers are plugged in to facilitate a quick get-away. One plane goes up, but other is ready in case of mechanical failure



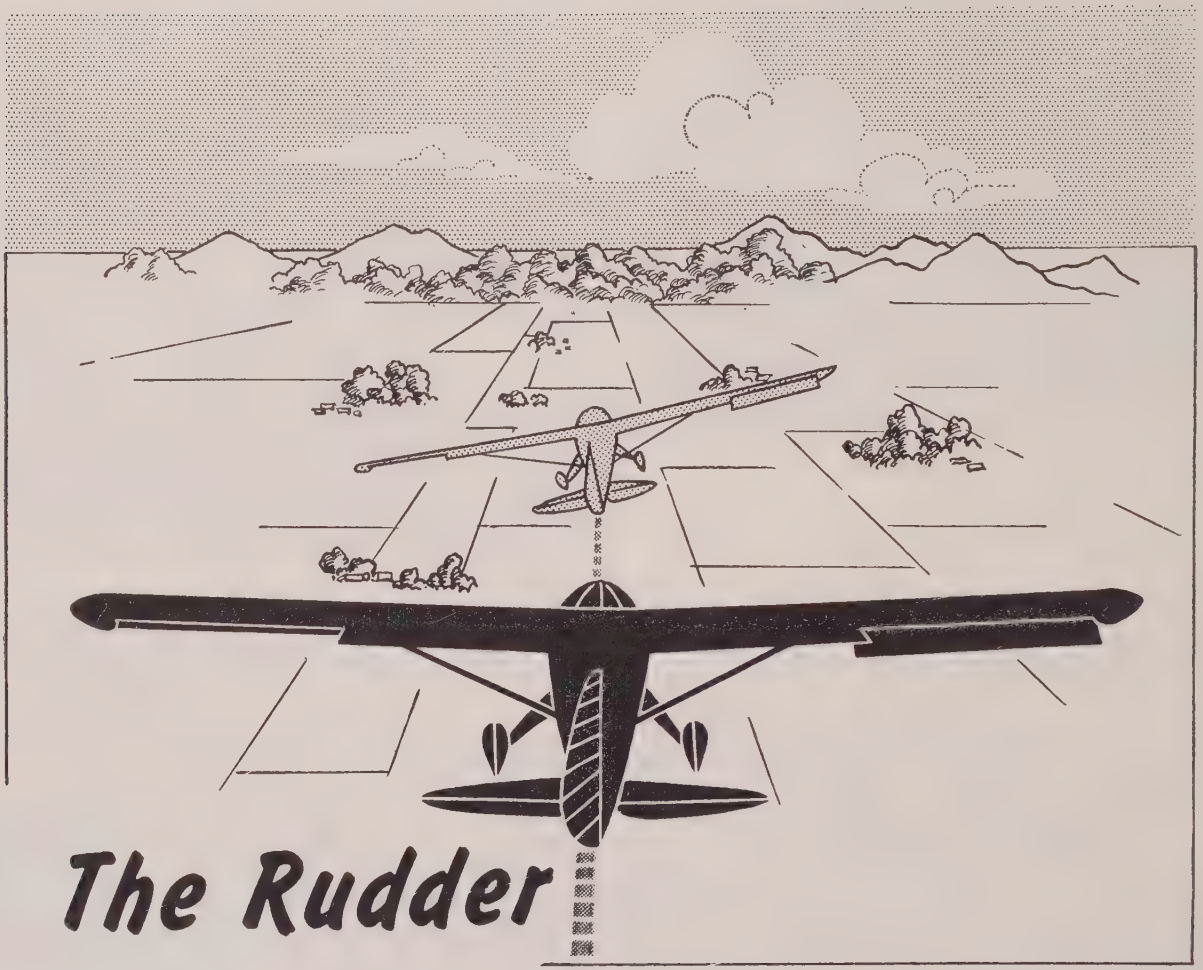


PILOT and radar operator *(above)* climb into F-94 cockpit while crew chief waits to "button them up." While crew chief straps in the men, a second crewman *(right)* stands by with the F-94's energizer



INTERCEPTOR taxies out for take off to meet the unidentified aircraft picked up on radarscopes

PLANE takes off to intercept what could be an enemy plane. The F-94 is equipped with radar viewing scope in rear seat



The Rudder and the Turn

PILOT uses aileron with rudder. This kills adverse yaw effect. Plane banks and once banked begins to turn left

By JOHN E. McCLOUD

ON ANY warm Sunday afternoon a common sight around most airports is the specter of a youthful airman telling some sweet young thing all about the flying machines. "And this," he will say after referring to his illustrated eight-page flying manual, "is the rudder which makes the airplane turn." Our boy is not alone in having the mistaken idea that the rudder pedals serve the same purpose in turning an airplane that the steering wheel serves in turning a car.

A car going around a banked turn is actually very much like an airplane in a turn. If a car is

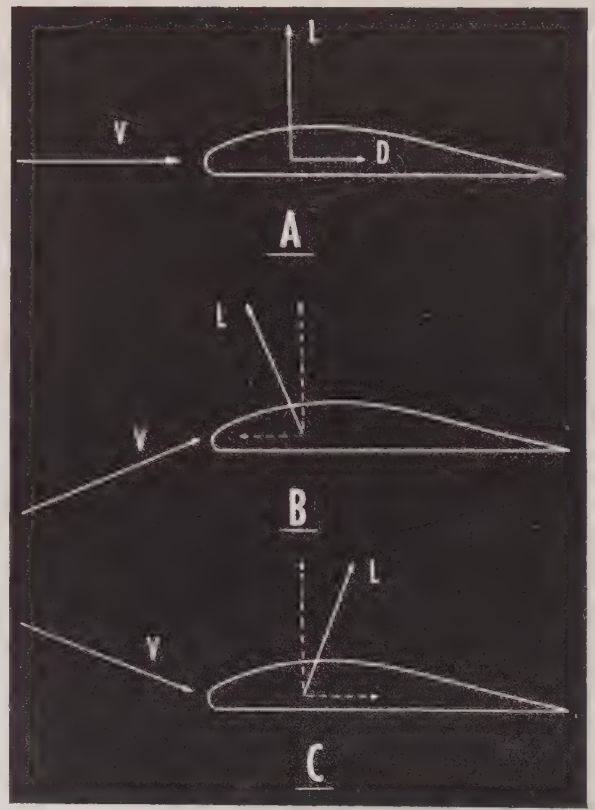
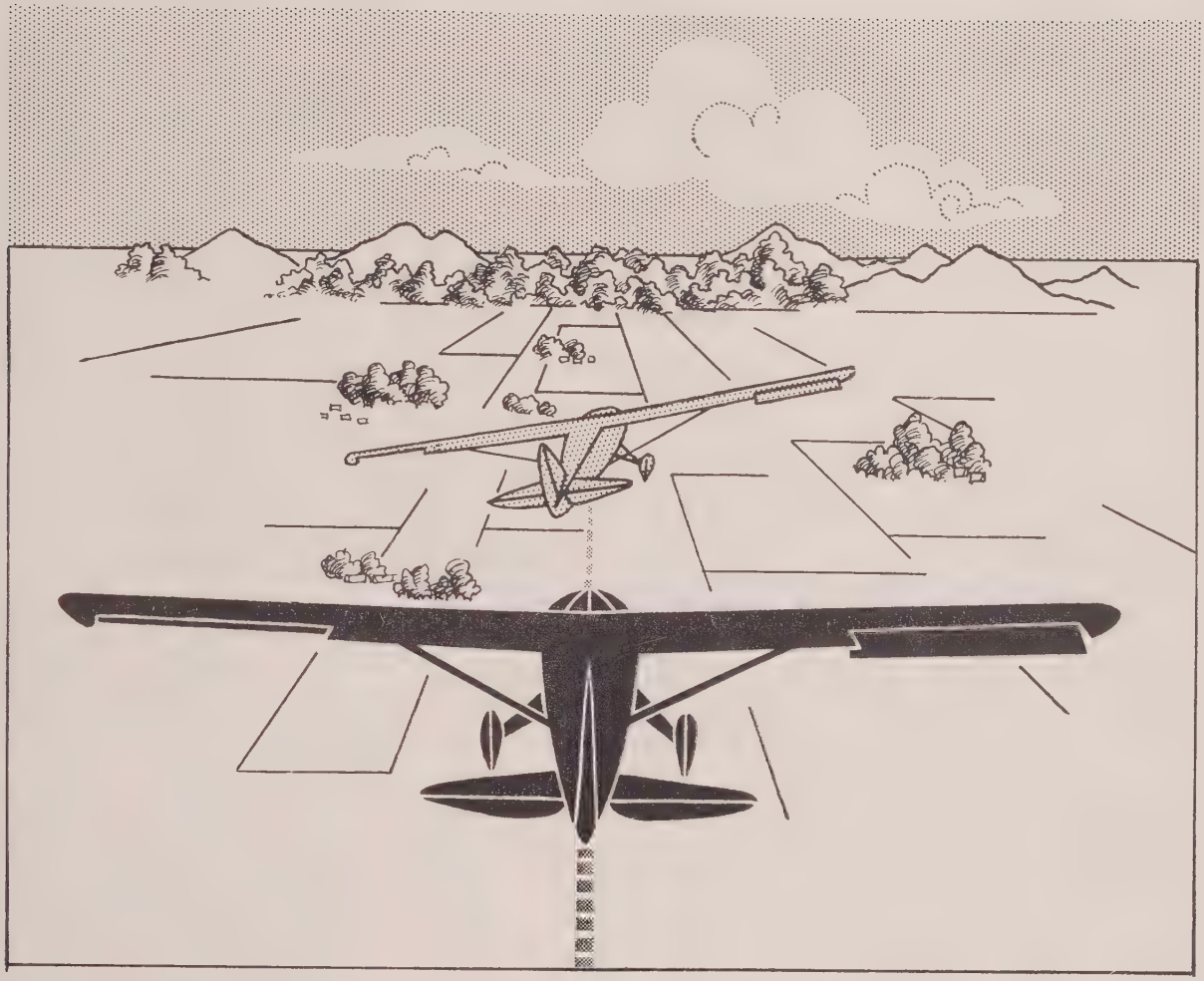


DIAGRAM represents an airfoil section in (A) level flight, (B) inside dropping wing, (C) outside wing relative to wind



PILOT banks ship to left, intending to turn left. But he uses no rudder. Plane banks to left but it yaws to the right.

A left turn eventually will result because of the plane's bank, but it makes for a very sloppy and slipping maneuver

moving at just the right speed for the degree of bank in the road, so that the centrifugal force tending to pull the car toward the outside of the turn equals the gravitational force trying to pull it downward toward the inside of the turn, the car will continue to turn properly without hands touching the steering wheel. Similarly, a correctly trimmed plane flying in still air will continue in a properly executed turn even though the pilot removes his hands and feet from the controls

The car turning on a banked curve is much like the banked and turning airplane, but that is as far as the similarity goes. The car can be turned successfully on an unbanked road, but the airplane must be banked to turn successfully. The banked highway merely serves as a convenience to the motorist by enabling him to go around the turn at higher speed. The banking of the airplane, however, is not just for convenience; it is what makes the plane turn.

But our fledgling airman wants to question these statements. "If the bank is what causes the turn," he asks, "why use the rudder? Why not just bank with the ailerons and forget the rudder?"

The answer to that is the rudder is used to correct for adverse yaw: the tendency of an airplane to turn in the direction opposite that in which it is being banked. While the plane is being banked to the left, it will try to (*Continued on page 56*)

PLANE in coordinated turn and bank is result of properly used rudder and aileron: rudder to kill adverse yaw effect

HANGAR FLYING

Flying Businessman

Hal W. Harman, 53-year-old president of the Harman Process Company, El Paso, Texas, has been named "Flying Businessman of the Month" by Ryan. Harman is the second of a series of monthly champs to be honored by Ryan in a competition it is sponsoring to determine the American businessmen who log the most hours in their *Navions*.

Rocket Ready

Airplane designer R. S. Johnson reports the new all-metal five-place Regent *Rocket* is about ready for flight testing. The plane is powered by 260-hp engine, and is a new version of the Johnson *Rocket*. Company reorganization included the new name: Regent Aircraft Corporation.

Flying Farmers

Piper Aircraft Corporation has loaned a new 1951 Piper *Tri-Pacer* to the Flying Farmers Association. The plane will be used by NFFA's Field Secretary Del Fuhriman of Tremonton, Utah. Presentation of the plane was recently made at Agricultural Aviation Conference in Memphis, Tennessee.

Contract Flight School

The first civilian contract basic pilot training school to go into operation for the USAF since World War II began its training program in early March. An initial class of 135 aviation cadets are now being trained at the reactivated Greenville AFB. Operations are being carried out by Graham Aviation of Butler, Pennsylvania. Air Force officers are supervising teaching procedure for both flight and ground instruction; and 45 civilian pilots are acting as flight instructors. In time there will be 135 civilian instructors at the base.

CAA Film Library

Two new films have been added to the CAA's library of instructive and informative movies on aviation. The new ones: "Safe Airmen" and "Safe Flight Operations," are available for showing to any group interested in the nation's civil flying activities. Other pictures are: "A Plane is Born," "Safe Aircraft," and "Safety in Aviation." All films distributed by the CAA are free and the only expense to the borrower is the transportation cost. If your group is interested in seeing these movies (some are silent; some are sound), write for the 1951 catalogue. It is free and can be obtained from the Office of Aviation Information, CAA, Washington, D.C. The films themselves are distributed by CAA's Aviation Education Division in Washington and from the seven CAA regional headquarters in the U.S.: (1) N. Y. International Airport, Jamaica, L. I., N. Y.; (2) 84 Marietta Street, Atlanta, Ga.; (3) Chicago International Airport, Park Ridge, Ill.; (4) P. O. Box 1689, Fort Worth, Texas; (5) City Hall Building, Kansas City, Mo.; (6) 5651 West Manchester Avenue, Los Angeles, Cal.; (7) P. O. Box 3224, Seattle, Washington.

British Nat'l Air Races

The Royal Aero Club of the United Kingdom is holding its yearly meet at Hatfield Aerodrome, Hartfordshire, England, on Saturday, June 23. Six of the seven racing events are international, being open to qualified pilots and planes throughout the world. One event is scheduled for jets. Both light and heavy aircraft may qualify for the six international events.

L. A. to Honolulu on Foot

Jean Goodnight, stewardess for United Air Lines, was asked once how "far" she traveled on foot while performing her duties aboard a Mainliner *Stratocruiser* during its nine-hour and 30-minute flight from Los Angeles to Honolulu. To get the answer, Miss Goodnight strapped a tiny pedometer to her ankle to clock her steps on the 2,257-mile trip. The pedometer showed Miss Goodnight took 23,760 steps, which figures up to four and one-half miles!

News Notes

Panagra (Pan American-Grace Airways, Inc.) has announced the appointment of Buell A. Patterson as Director of Publicity. Mr. Patterson, one of the best-known aviation publicists, was formerly with American Airlines.

★

Lear, Incorporated, of Grand Rapids, Mich., reports the election of Albert G. Handschumacher to the company's Board of Directors. As Vice President of Lear, Mr. Handschumacher takes over responsibilities of a newly created position of Assistant General Manager of Lear, Inc. Grand Rapids operation.

★

Trans-Texas Airways sales and service division was named distributor in Texas and Louisiana for the new Aero *Commander*, twin-engine executive-type airplane to be on the market this coming fall.

★

American Airlines has named Joseph D Ryle as Director of Public Relations. Mr Ryle's appointment fills the vacancy left b the resignation of Ben Wright to become a executive of Field & Stream magazine.

★

National Airline employees have begun campaign to raise money for a memoria nurses' home in the name of Mary France Housley, the heroic National Airlines' stew ardess who lost her life while helping pas sengers from a wrecked plane. National Air lines is also making a sizeable contributio from the company treasury. The public wil not be actively solicited.

★

Luscombe Service Order Department with headquarters at the Luscombe plant in Gar land, Texas, will be the source of part sales and service activities for the Temco *Swift* and the Luscombe *Silvaire*.

★

New England Aircraft School, one of the oldest aircraft schools in the U.S., was given to Boston University recently by its founder H. N. Carlson. The school will continue it operation at Logan International Airpor until its new building on the campus o B.U. is completed.

★

Roscoe Turner Aeronautical Corp., of In dianapolis, Indiana, has made "Syn-Cote" available. "Syn-Cote" is a tough plastic coat ing made especially to protect metal, wood and fabric surfaces on aircraft. It is non flammable and can be sprayed on surfaces to form a pliable, non-porous sheet.

	Complete Aircraft			Manufacturer's Net Billing Price		
	Shipments			Shipments		
	TOTAL Jan-Feb	February	January	TOTAL Jan-Feb	February	January
				(thousands of dollars)		
Aeronca						
Champion 90 hp	6	2	4			
Sedan	10	6	4	51	28	23
7CCM a/	2	1	1			
Beech						
Bonanza	52	25	27			
D-18	10	3	7	1,223	456	767
Cessna						
140A	26	14	12			
170A	69	39	30			
190	6	—	6	617	281	336
195	8	2	6			
Engineering & Research						
G	4	1	3	13	3	10
Luscombe - 8-F	13	5	8	36	14	22
Mooney - M-18	5	3	2	10	6	4
Piper						
Tandem Trainer	100	40	60			
Pacer	91	63	28	616	356	260
Ryan - Navion	67	22	45	779	253	526
Taylorcraft						
Sportsman	4	3	1	7	5	2
Texas Engineering						
GC1B	4	2	2	15	8	7
TOTAL	477	231	246	3,367	1,410	1,957

a/ Military type aircraft sold to other than U.S. Military Customers.

SHIPMENT of 231 personal, executive planes was made by 10 companies during Februar

I WISH to thank the editors of SKYWAYS MAGAZINE for producing this collection of United States Air Force pictures.

As these pictures show, air power is not merely airplanes in the air —bombers, fighters, interceptors, reconnaissance planes, and transports. Air power is scientific research, technological development, industrial production, trained personnel, streamlined organization, and good management. It is an economical and effective concentration of the technical aptitudes and skills of the nation, directed toward helping to guarantee the security of our nation.

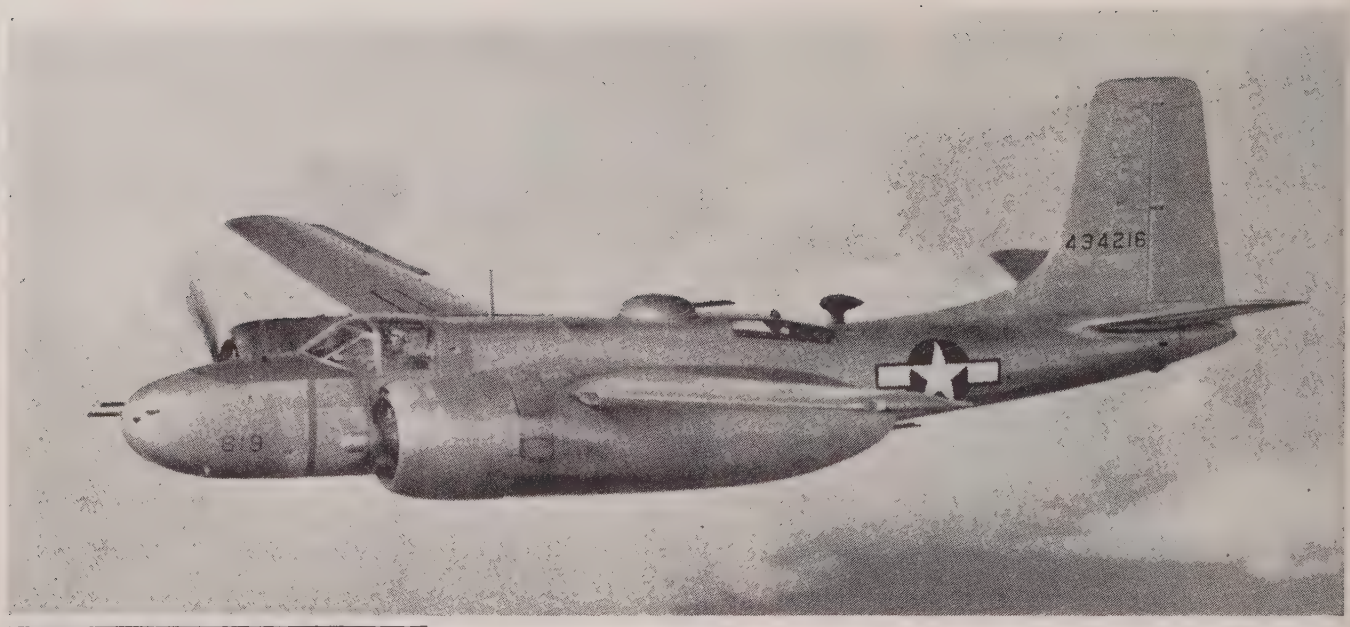
In carrying out its mission, the Air Force works as a member of the National Defense team. It depends on both the Army and Navy for support, and it also cooperates with many other agencies of the government in building up this team. Its own strength is the sum of its components and not air defense, strategic air, or tactical air alone. The aim of the Air Force is to create, for the use and protection of free peoples, total air power of such potentialities that it will serve as a deterrent against aggression from any source and consequently prevent war, and preserve the peace.

Hoyt S. Vandenberg

General, Chief of Staff, USAF

U.S. AIR FORCE

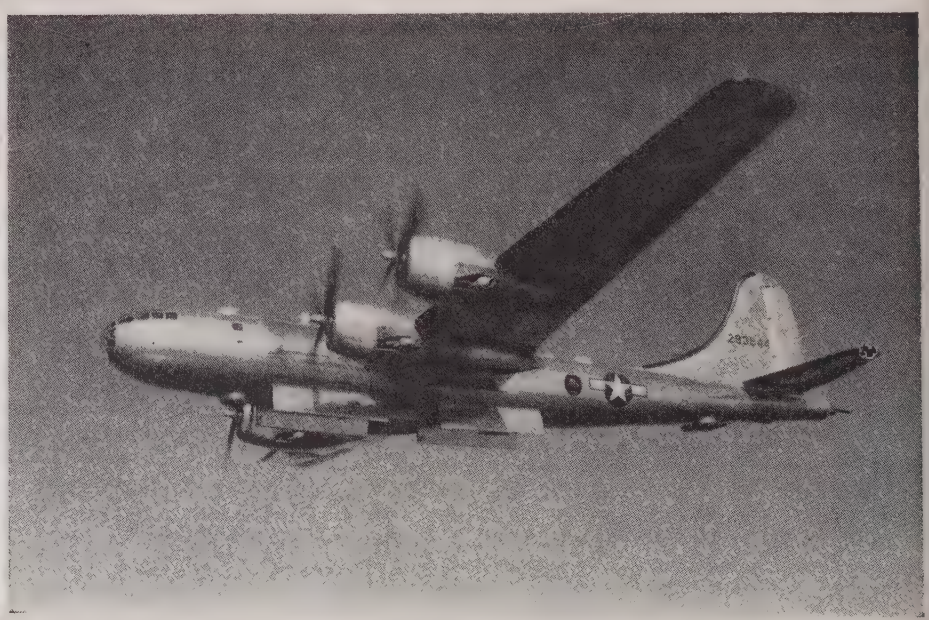
Special Section

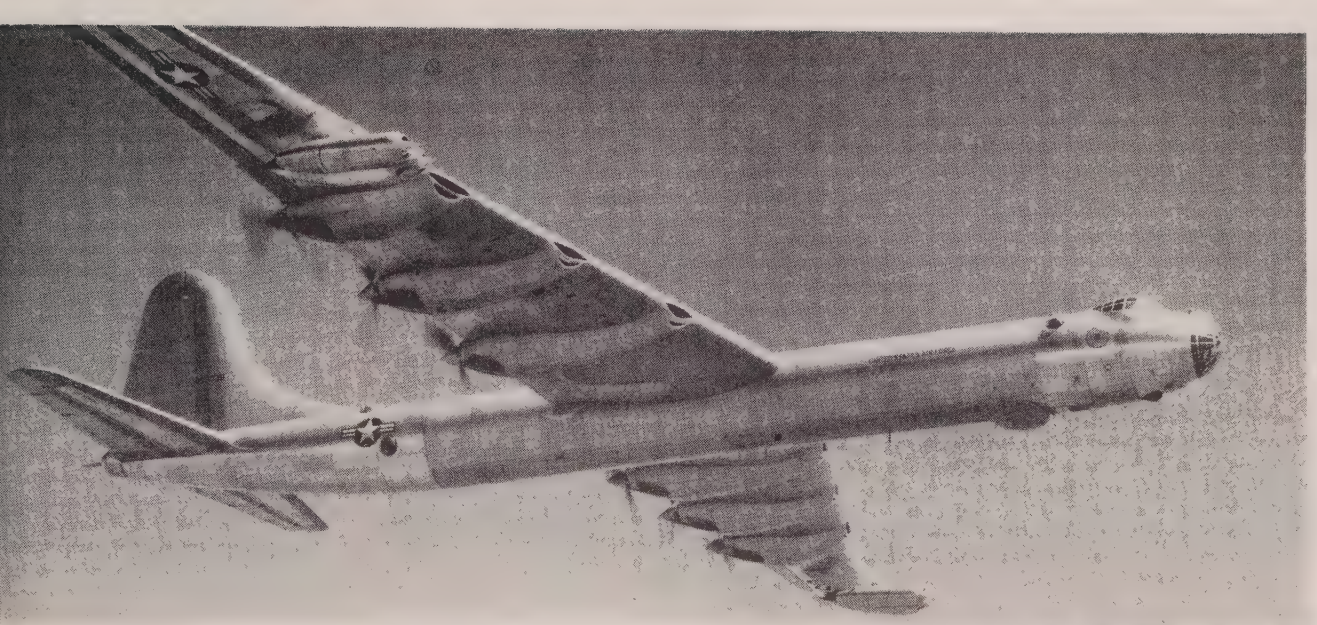


BOMBERS

DOUGLAS B-26—This attack bomber was designated A-26 *Invader* during World War II. Now in operation in Korea, the B-26 is doing an excellent low-level job, filling the gap that resulted from pre-Korea emphasis on strategic air power. The B-26 is powered by two Pratt & Whitney R-2800 engines rated at 1600 hp each (take-off rating: 2,000 hp). Props are three-bladed Hamilton Hydromatics. Bomber carries crew of three, has combat radius over 900 miles at 5,000 feet at 206 mph. It has a top speed of 350 mph, cruises at 266 mph, and has a service ceiling of 25,000+ feet. It has a wing span of 70 feet, is 50 feet 10 inches long, and sits 18 feet 6 inches high over fin and rudder. Armament consists of machine guns and cannon. The B-26 probably will be replaced by a jet light bomber in the very near future

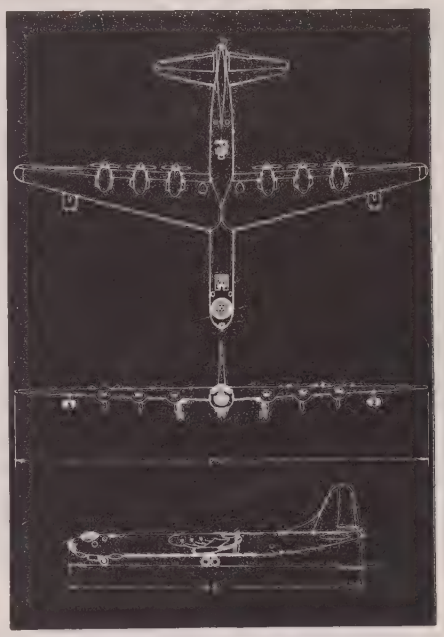
BOEING B-29—Classified as a Heavy during World War II, the B-29 *(below)* today is considered a medium bomber. It is powered by four Wright R-3350 engines, each rated 2200 hp, with Hamilton Standard Hydromatic propellers. It carries a crew of from 10 to 14, and has a combat radius of 2000+ miles under normal conditions at cruising speed. The B-29 has a top speed of 350+ mph at 25,000 feet. Armament consists of remotely controlled and electrically operated turrets with 12.7 mm guns. Two bomb bays carry a bomb load of 20,000 pounds. The B-29 is in operation with the U.N. forces in Korea; some B-29's are being converted to tankers for refueling operations with the B-50, etc. It has a wing span of 141 feet, is 99 feet long, and sits (over the fin and rudder) 27 feet 9 inches high. Photo version is RB-29

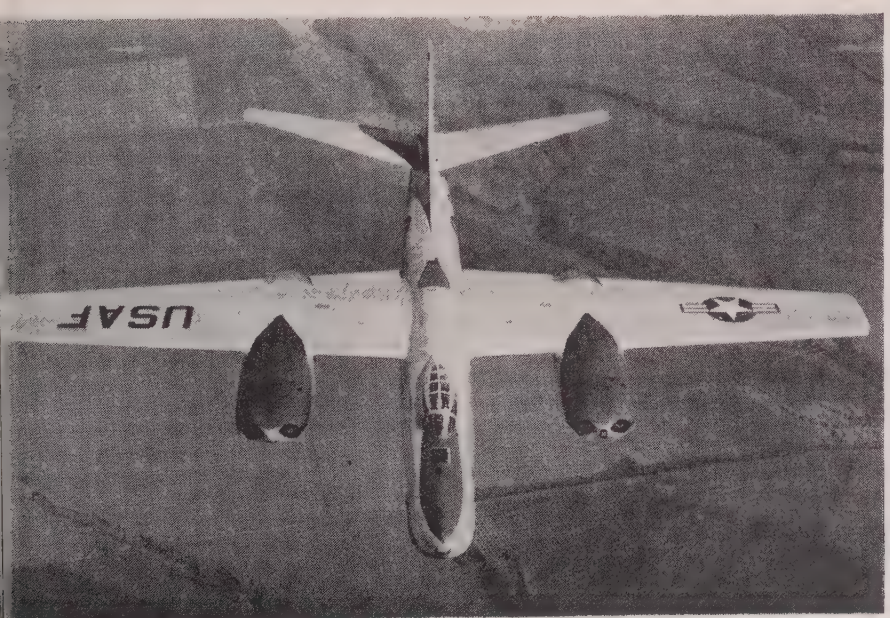


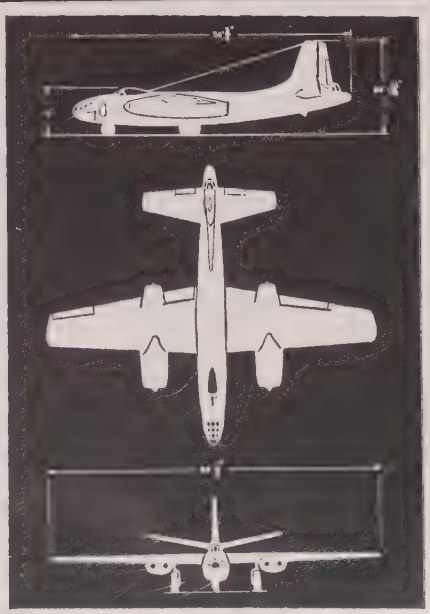


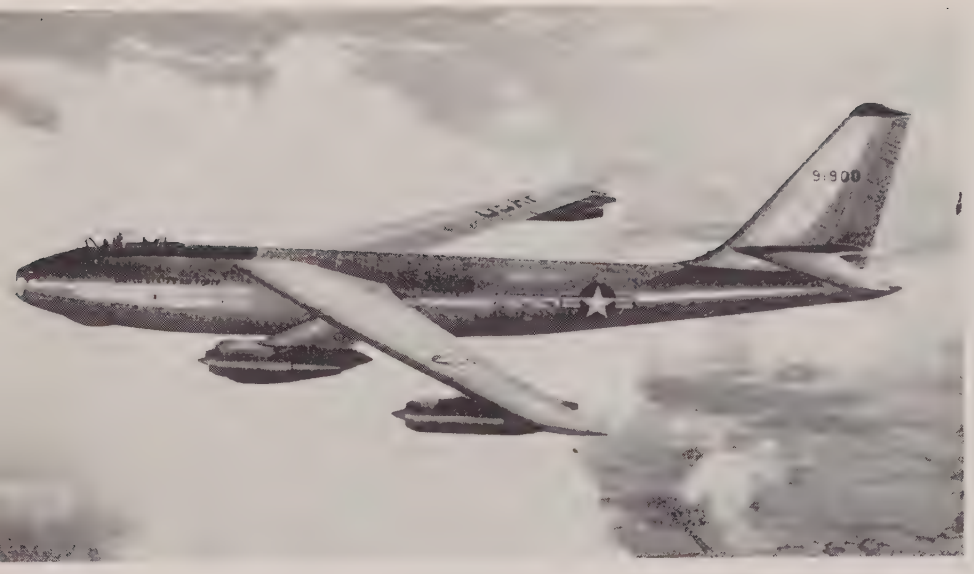
CONSOLIDATED B-36D—At this point the B-36 is the Air Force's only heavy bomber. B-36 is powered by six Pratt & Whitney R-4360 engines of 3500 hp (maximum) each, plus four GE J-47 turbojets mounted in pairs in pods under each wing. The J-47's are rated 5200 pounds thrust each. The B-36D has a top speed of more than 435 mph and a service ceiling of more than 45,000 feet. Its range is given as 10,000 miles. The bomber carries a crew of 15, including a four-man relief team, and it has maximum bomb load of 84,000 pounds (design bomb load is 10,000 pounds). The B-36D has a wing span of 230 feet, is 162 feet in length, and its height (tail tip) is 46 feet 9 inches. Propellers on the ship are three-bladed Curtiss electrics (pushers) with reversible pitch. It employs tricycle landing gear with dual nose wheel

NORTH AMERICAN B-45—The four-jet B-45 *(below)* was Air Force's first operational bomber to employ jet propulsion. Powered by four GE J-47 turbojets, the B-45 has a top speed of more than 550 mph and a service ceiling of over 40,000 feet. The J-47's have a rating of 5200 pounds thrust each. Tactical radius of the bomber is more than 800 miles. It carries a crew of four, has wing span of 89 feet 6 inches, an over-all length of 75 feet, and over-all height of 25 feet. It carries a bomb load of more than 10 tons, has a gross weight of 82,600 pounds, and a wing loading of 70.3. It has an hydraulically retractable landing gear and nose gear. Called *Tornado*, 139 are on order or have been delivered to the Air Force. The airplane is classified as a medium bomber. Long-range version, B-45C, carries wing tanks

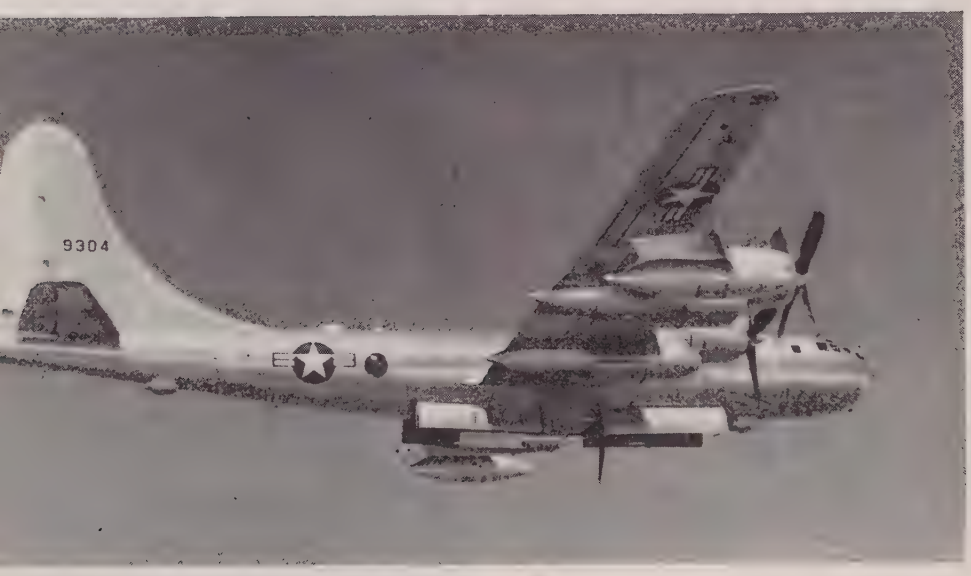






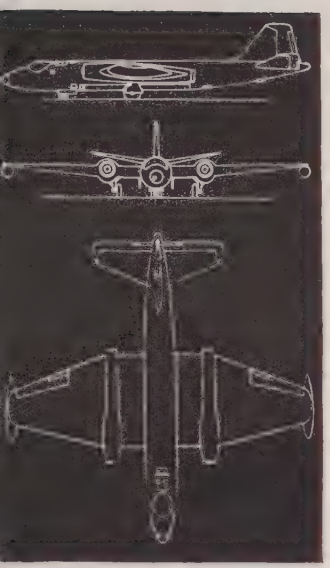


BOEING B-47—Called the *Stratojet*, the B-47 is a swept-wing medium bomber powered by six GE J-47 turbojets each having a rating of 5200 pounds thrust. Carrying a crew of three, the B-47 is in the over-600-mph class and has a service ceiling over 40,000 feet, a range of more than 2,000 miles, and a bomb load of over 20,000 pounds. In addition to the six J-47 turbojet engines, the *Stratojet* has provisions for 18 integral JATO rocket units rated at 1,000 pounds thrust each. With the new Allison J-35-A-23 jet engine now available, the YB-47C will be powered by four J-35's instead of six J-47's. The '35 is a much more powerful engine than the '47, and offers an improved fuel economy; expects to fly this year



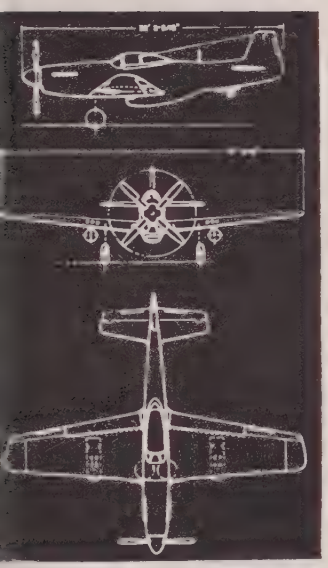
BOEING B-50—The new *Superfortress* is the B-50, a development of World War II B-29. Classified as a medium bomber, the B-50D is powered by four Pratt & Whitney R-3460-35 *Wasp Majors*, each having a take-off rating of 3500 hp. The bomber carries a crew of 11 and has a total bomb capacity of 28,000 pounds. It has a gross weight of 164,500 pounds. Maximum speed of the B-50 is over 400 mph, and its cruising speed is 300 mph. It has a service ceiling of over 40,000 feet, and combat radius of over 2300 miles with a full load. The 'D version of the B-50 is equipped with two 700-gallon streamlined external fuel tanks to further extend its range. Another feature is Boeing-developed in-air refueling system

MARTIN XB-51—A ground-support bomber, the XB-51 is powered by three GE J-47 turbojet engines with afterburners. Each jet engine has a rating of 5200 pounds thrust, with added thrust from the afterburners. It is classified as a high-speed bomber. The '51 has combat radius less than 1,000 miles. It carries a crew of two, has a wing span of 55 feet, is 80 feet long. Feature of the XB-51 is a deceleration parachute to shorten its landing run. It also features a bicycle-type landing gear: dual wheels mounted in tandem; two small outrigger wheels support the ship's wings when on the ground. A variable incidence wing provides maximum lift for take-off and landing, without requiring a nose-up attitude

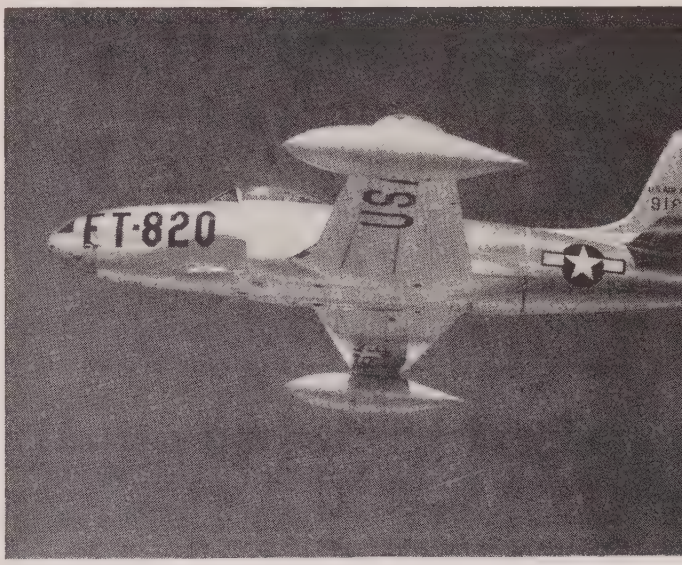


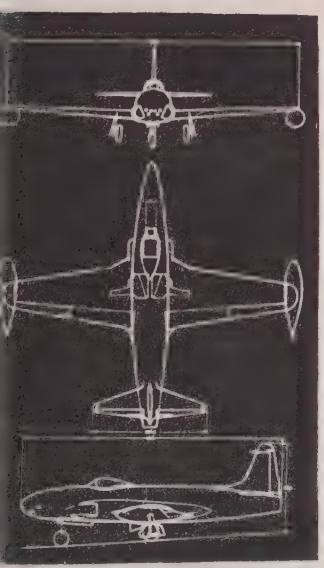
ENGLISH ELECTRIC CANBERRA—A twin-jet tactical bomber developed by the English Electric Co. in England, the *Canberra* is a popular RAF medium bomber that will see production in the United States. At press time, word was received that the Air Force designation of the high-speed, high-altitude English Electric Canberra will be B-57. Plans are for the Glenn L. Martin Company, Baltimore, Maryland, to build this bomber. It is powered by two Rolls Royce *Avon* turbojets, each having a thrust rating of 6,000 pounds. Details of its performance are highly classified at this time. The *Canberra* carries a crew of three in a pressurized cabin in the front fuselage. It has a wing span of 64 feet, and is 65 feet 6 inches long

FIGHTERS

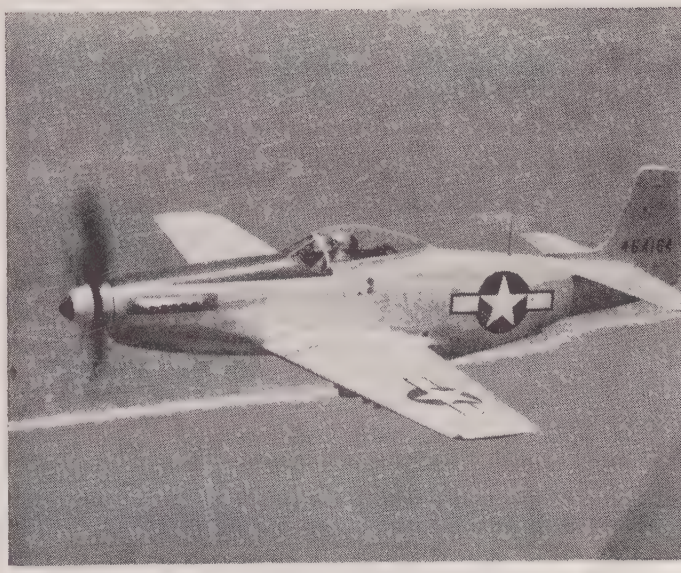


LOCKHEED F-80—The *Shooting Star* was one of the Air Force's first jet fighters. Designated the F-80, it is a single-seater fighter powered by an Allison J-33-A-23 turbojet engine having a thrust rating of 5200 pounds. It has a top speed of 600 mph and a stalling speed of 117 mph. Its service ceiling is over 40,000 feet, and its range is 1,670 miles (combat radius: over 500 miles). Wing-tip tanks with a capacity of 885 gallons add to the F-80's range. Its rate of climb is 5,175 fpm at sea level and full gross weight

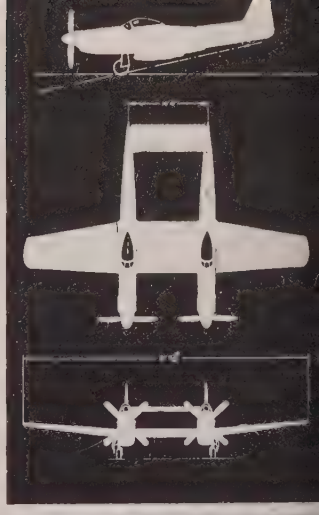


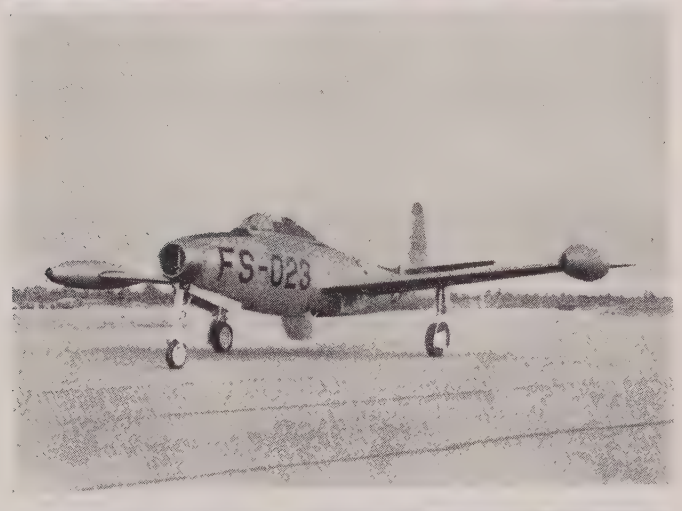


NORTH AMERICAN F-51—This World War II fighter is being included in this Air Force section because of the flying and fighting it is doing in the war in Korea. A single-seater, the F-51 is powered by Packard-built *Merlin* engine of 1,335 hp. Latest version of the F-51, the F-51H, has top speed of 460 mph and a cruise range of more than 2200 miles. Added boost of a fuel injection pump permits the F-51 to operate efficiently at altitudes up to 40,000 feet, and increases its rate of climb. Armament includes six .50-caliber machine guns in the wings. The *Mustang* swings a four-bladed Aeroproducts propeller. It has a wing span of 37 feet, is 33 feet 4 inches in length. It is no longer in production

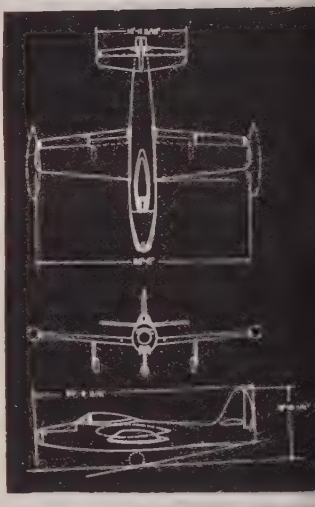


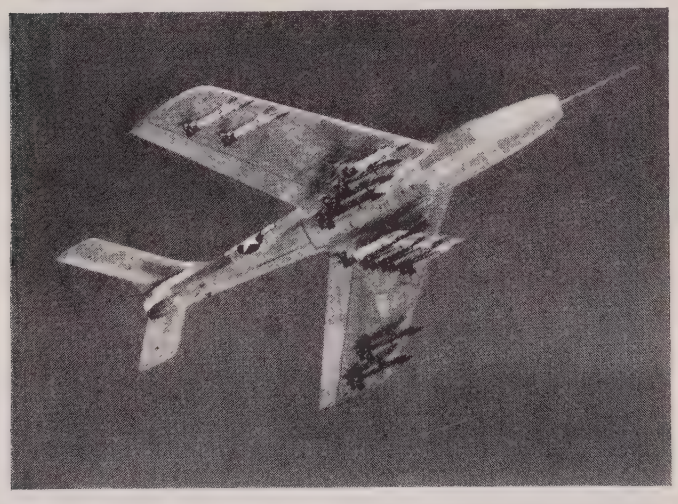
NO. AMERICAN F-82—The *Twin Mustang* is high-altitude long-range escort fighter, a development of the F-51. It is a two-seater powered by two Allison V-1710 engines with a take-off rating of 1550 hp each. The F-82 has a top speed over 400 mph, a ceiling of more than 40,000 feet, and a range over 2500 miles. It has a wing span of 51 feet 6 inches, is 39 feet 5 inches long; utilizes two full-feathering four-bladed Aeroproducts propellers, and carries radar equipment in right cockpit (G model) where the radar operator sits



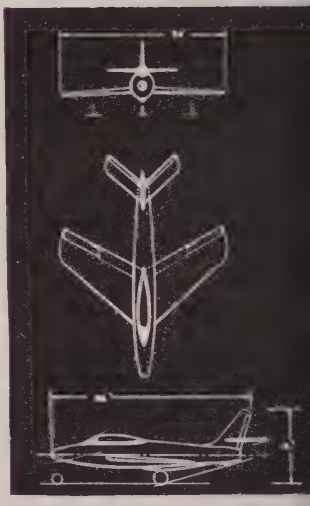


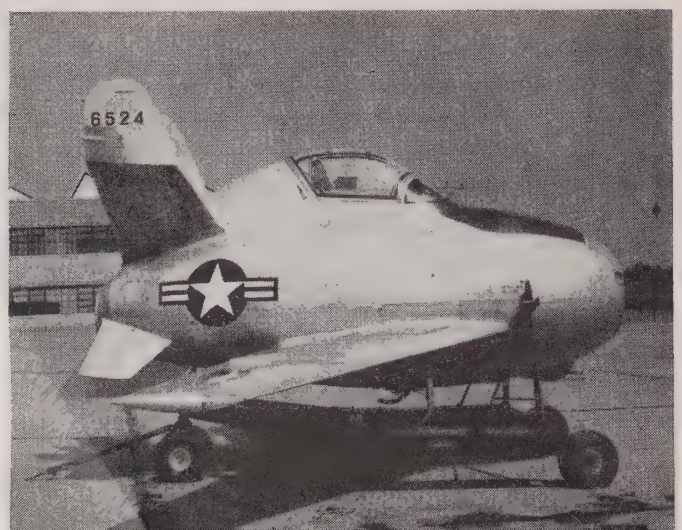
REPUBLIC F-84E—This jet fighter is powered by Allison J-35-17 turbojet having a thrust rating of 5,000 pounds. It is in the over-600-mph class, and has a radius of action better than 850 miles. Called the *Thunderjet*, it is a ground-support fighter that has a service ceiling of more than 45,000 feet. It has a wing span of 36 feet 5 inches, is 37 feet 3 inches long, 12 feet 10 inches in height; is armed with HVAR rockets, machine guns, two thousand-pound bombs and napalm tanks. It is now in U.N. service in Korea providing excellent ground support



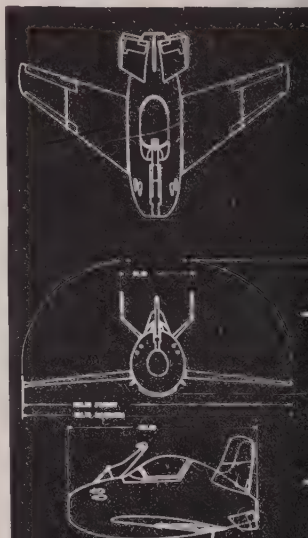


REPUBLIC F-84F—Latest version of the famed *Thunderjet* is the F-84F with its swept-back wings and tail surfaces. Powered by Allison J-35-25, the newest F-84 is in the over-600-mph class and has a service ceiling of more than 45,000 feet. It has a gross weight of 25,000 pounds and carries more armament than its predecessor, the F-84E. It has a wing span of 34 feet, is 38 feet in length, 14 feet high. The F-84F can carry 32 five-inch rockets or its equivalent in bombs, napalm, etc. Production model will have a J-65; 7200 pounds thrust

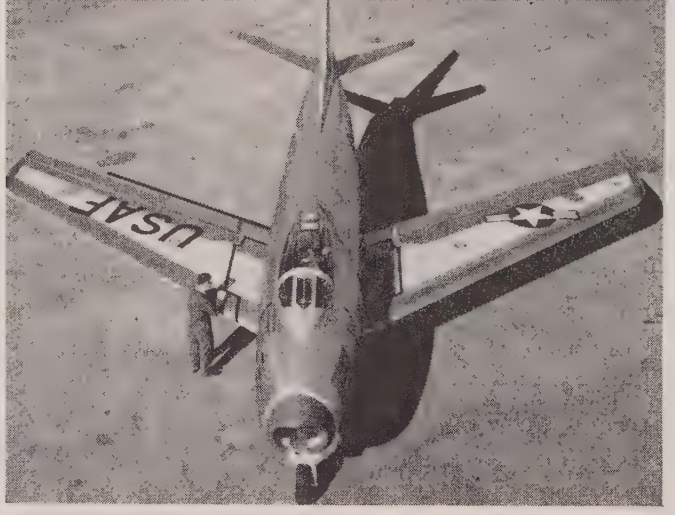


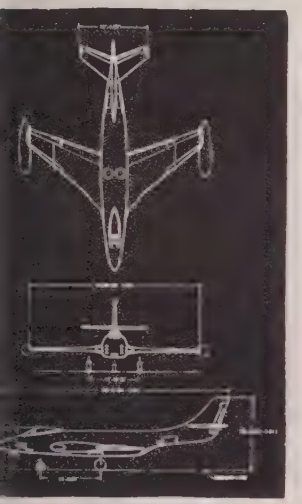


MCDONNELL XF-85—Called a parasite fighter, the XF-85 is a jet fighter designed to be carried in the bomb bay of a larger aircraft, to take-off and land back aboard the "mother" ship in flight. It is powered by Westinghouse J-34 turbojet engine having a rated take-off thrust of 3,000 pounds. It is a single seater and has no landing gear of its own. The XF-85 has a wing span of 21 feet, is 15 feet long. It is experimental



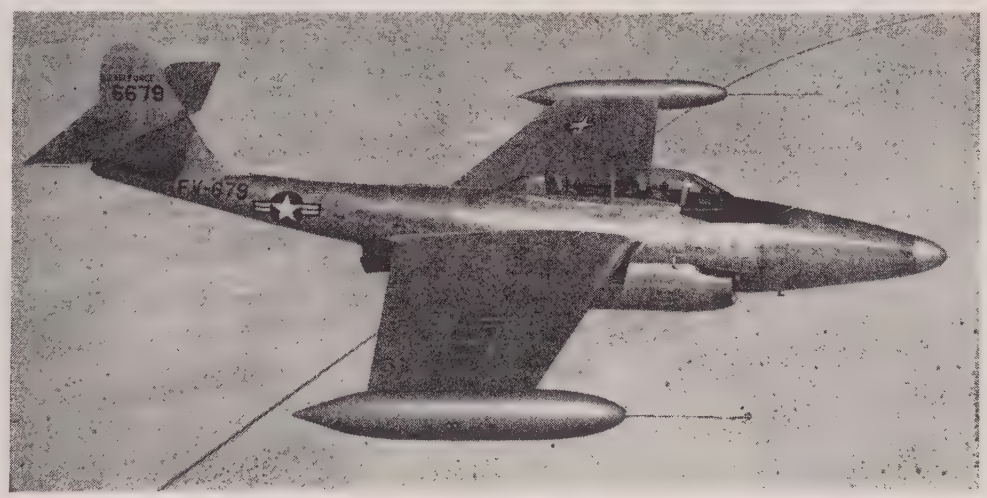
NO. AMERICAN F-86E—One of the newest of the *Sabres* is the 'E version. Feature of this model is its "all-flying" tail. Entire horizontal tail surfaces are controllable to give better longitudinal control. F-86E controls are powered by independent source to give more positive control. "Artificial feel" system gives pilot better "feel" of control forces. Aside from these, F-86E is like earlier *Sabres*. It is powered by J-47A turbojet, has tactical radius of 500 miles, is in "over-600-mph" class, is one of AF's front line fighters

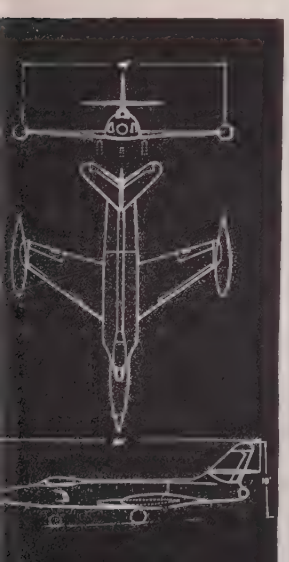




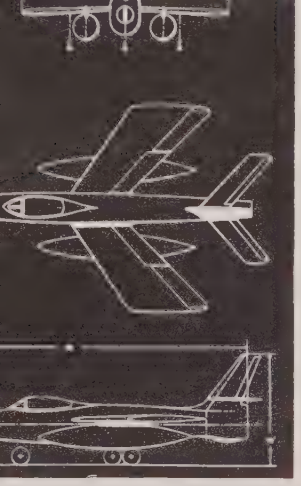
MCDONNELL XF-88—This twin-jet penetration fighter is still undergoing AF tests. Powered by two Westinghouse J-34 turbojets, the XF-88 is in high-speed class. One of the experimental models is equipped with afterburner which further adds to plane's power. Each turbojet engine has normal rating of 4,000 pounds thrust. The fighter has a wing span of 39 feet 8 inches, is 55 feet long and 15 feet high. Both the wing and tail surfaces of XF-88 are wafer-thin to reduce effects of drag to an absolute minimum

NORTHROP F-89—Called the *Scorpion*, the F-89 is all-weather interceptor that combines range, speed and fire power with "X-ray eyes." Carrying a crew of two (pilot and radar operator), it is powered by two Allison J-35 turbojet engines, each having a rating of more than 4,000 pounds thrust with afterburner. The *Scorpion* has a speed of more than 600 mph, a service ceiling of more than 40,000 feet and a gross weight over 30,000 pounds; has 50-foot wing span

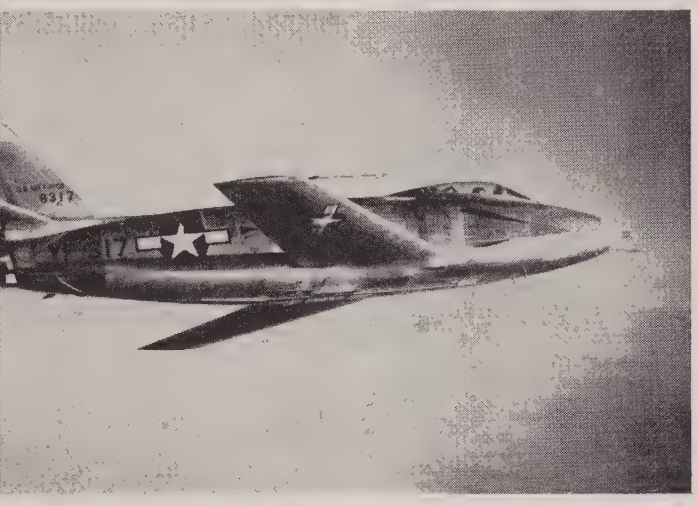




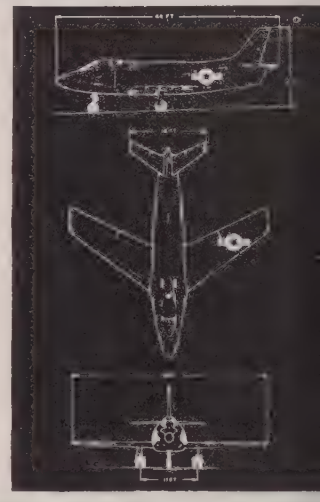
LOCKHEED XF-90—Another Air Force penetration fighter, the F-90 is a needle-nosed jet powered by two Westinghouse J-34's with afterburner. Each engine is rated at more than 4,000 pounds thrust. A single-placer, it has a top speed higher than the F-80. The F-90 has a wing span of 40 feet, a sweepback of 35°; is 56 feet long and its height at the tail is 14 feet. Other specifications, performance figures, power-plant details, etc., are classified

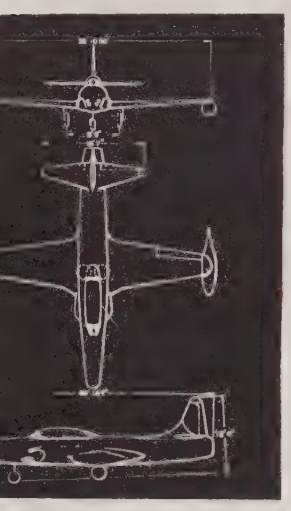


REPUBLIC XF-91—A high-altitude interceptor, the XF-91 recently completed its initial AF tests. It is powered by a GE J-47 engine with afterburner and is said to have a speed of more than 750 mph. Four rocket motors are installed to give the XF-91 a rapid rate of climb to high altitude. The interceptor features a wing of inverse taper, and a tandem-type landing gear under each wing. It has a wing span of 30 feet, is 45 feet long, 18 feet high. The F-91's cockpit is refrigerated

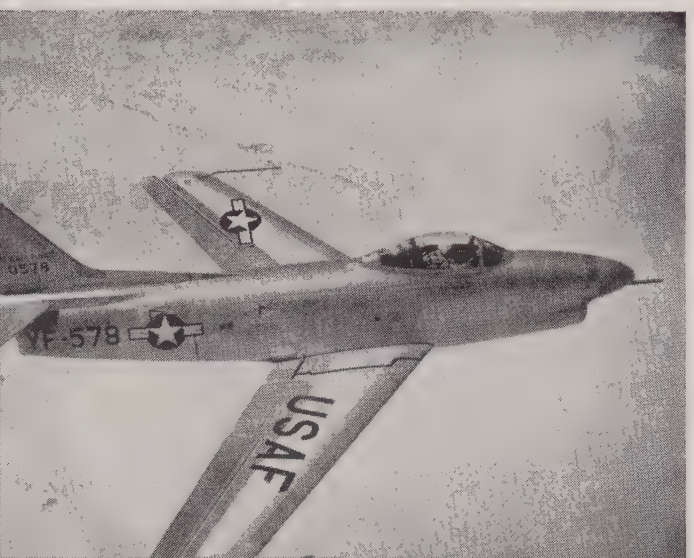


NO. AMERICAN YF-93A—Another penetration fighter is the YF-93A powered by Pratt & Whitney J-48 turbojet developing 6,250 pounds of thrust, further increased by an afterburner. Heavier than most of today's fighters, the plane requires two wheels on each strut of main landing gear. This fighter is in the very-high-speed class. It has a wing span of 39 feet, is 44 feet long and 16 feet high. Although performance figures are restricted, we do know the YF-93A is, by jet standards, long-range plane. All details are classified

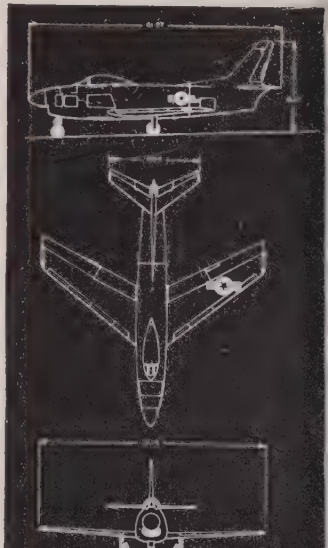




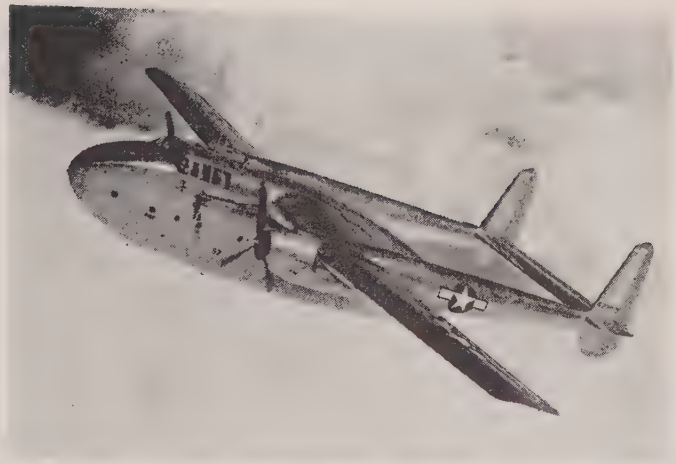
LOCKHEED F-94—An all-weather jet interceptor, the F-94 is an advanced development of the famed F-80. Powered by an Allison J-33-A-33 turbojet with a thrust rating of 5200 pounds, the F-94 adds to its speed with an afterburner. In the 600-mph class, it has a service ceiling of more than 40,000 feet and a combat radius over 500 miles. It has wing span of 38 feet 10½ inches, is 40 feet 1½ inches long and 12 feet 8 inches high. Equipped with a lot of radar, it carries pilot and radarman. It has 648-gallon gas capacity



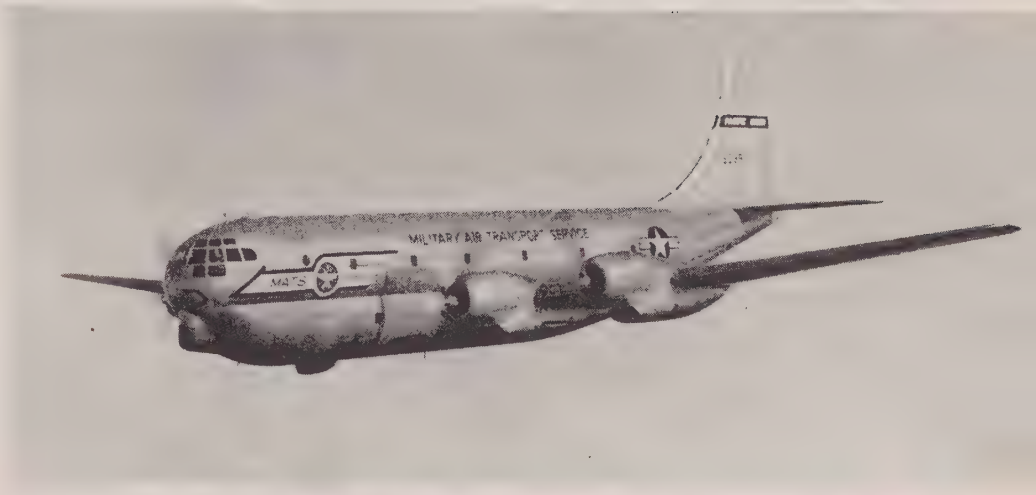
NO. AMERICAN F-86D—This *Sabre* is faster and flies higher than its F-86 predecessors. It differs from earlier versions by having its air intake duct under the shark nose housing radar equipment. It also has larger aft fuselage to accommodate a more powerful jet engine: GE J-47 with afterburner. It has wing span of 37 feet, is 41 feet long and 14 feet high. Sweptback wing and added thrust makes for better high-altitude turn performance and combat maneuverability



TRANSPORTS



AIRCHILD C-82—The *Packet* has seen a great deal of tion in Korea where is is a paratrooper-carrying trans- rt. Powered by two Pratt & Whitney R-2800 engines of 00 hp each, the C-82 has a top speed of 250 mph and service ceiling of 30,000 feet. It has a range of 2400 les. The *Packet's* wing span is 106 feet 6 inches; is 77 et 1 inch long and 26 feet 4 inches high. An experimental rsion is equipped with retractable tractor-tread land- gear. The *Packet* carries a crew of four and has a rmal seating capacity for 41. Its engines swing Hamil- Standard props. It has fuel capacity of 2,614 gallons



OEING C-97—The *Strato- ighter* is the Air Force's uble-deck cargo-carrying nsport. Powered by four att & Whitney *Wasp Major* gines, the *Stratofreighter* is 300-mph airplane. It is uipped with GE turbo-super- argers and Hamilton Stand- square-tipped reversible ops. Radar equipment is used in a radome under ne's nose. The C-97A can ry up to 53,000 pounds of go, or 134 fully equipped ops. It is pressurized and s a range of 4600 miles. ge doors under the tail of plane permit vehicles be- driven into the *Strato- ighter's* 60-foot upper deck

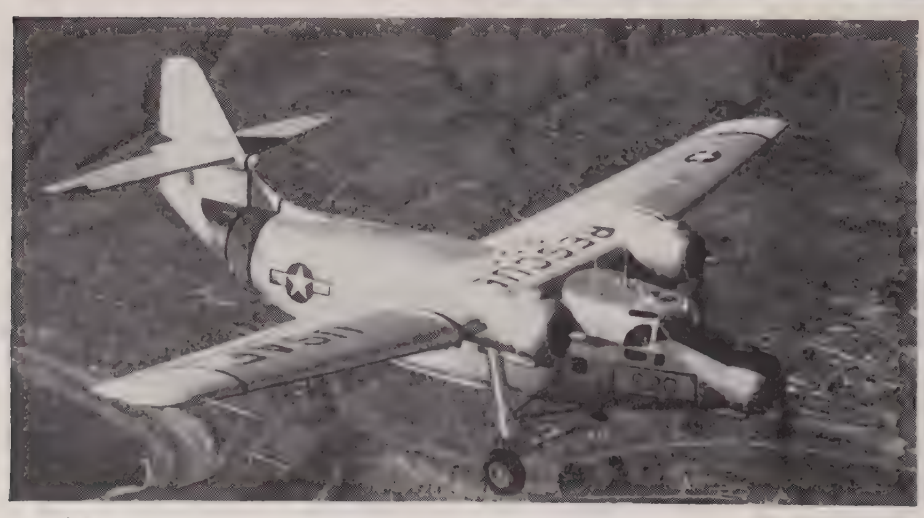
RCHILD XC-119—An improved version of the C-82 *cket* is the XC-119 *Packet*. It has increased power and pacity as well as better general performance. The XC- is still experimental for the Air Force. Most noticeable provement is the relocation of the flight deck to the e to give better vision. It is powered by two Pratt & itney 3250-hp engines with Hamilton props and has a ed of 250+ mph. It has combat radius of 1100 miles, ries up to 30,000 pounds of cargo or 42 fully equipped atroopers plus 20 500-pound containers of supplies. as a wing span of 109 feet 3 inches, is 85 feet 10 nes long and 26 feet 8 inches high. It has an empty ght of 37,691 pounds; 2,624-gallon fuel capacity

RCHILD C-120—The *Pack- ne* is something new in air nsports. It features a de- nable "pod" (*Packplane* is wn here without its cargo- rying "pod"). The plane is experimental. It is pow- d by two Pratt & Whitney 360 engines (same as those power the C-119), carries ew of five plus from 44 to passengers if used as troop nsport. It has a wing span 09 feet 3 inches, is 85 feet ,, and has a useful load of 00 pounds. It has a normal capacity of 2,798 gallons, s weight of 64,000 pounds

CHASE YC-122—A troop and cargo-carrying transport, the YC-122 is powered by two P & W R-2000 engines, each rated at 1350 hp for take-off, swinging three-bladed Hamilton Standard constant-speed props. Feature of the YC-122 is its spacious cargo compartment and a special loading ramp in the rear of the fuselage. As a personnel carrier, the YC-122 can carry 30 fully equipped troops. The ship can be used as a glider tug inasmuch as tow release assemblies are built into the nose and rear of the fuselage. It has 220-mph speed. It has a range of 1,000 miles

CHASE XC-123—A new and improved version of the YC-122, the XC-123 is a twin-engine troop and cargo-carrying transport that is considerably larger than its predecessor, the YC-122. It is powered by two Pratt & Whitney R-2800 engines with Hamilton Standard propellers. The engines are rated 1900 hp at 2600 rpm. As a personnel carrier, the XC-123 can accommodate 60 equipped troops. The cargo plane has a retractable tricycle-type landing gear, a wing span of 110 feet, is 77 feet 1 inch long. It has a combat radius of 750 miles

DOUGLAS C-124A—Heavy-duty all-purpose transport, the C-124A is twice the size of the C-54. Powered by four Pratt & Whitney R-4360 engines with a take-off rating of 3500 hp each, the C-124A carries a payload of 50,000 pounds of cargo 1100 miles and returns to base without refueling. As a personnel carrier, its cabin can be converted to a double-decker and can carry 222 troops and their field equipment. The *Globemaster* has a wing span of 173 feet 3 inches, is 127 feet long, over-all height of 48 feet

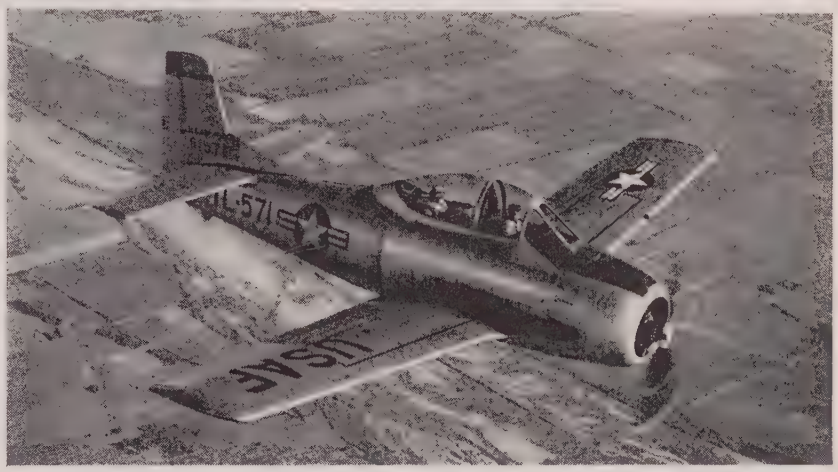


NORTHROP C-125—An Arctic rescue transport, the Northrop C-125 *Raider* is powered by three 736C9HD engines with a normal rating of 1425 hp at 2500 rpm each. The *Raider* was designed specifically for economical operations under primitive conditions from small airports and airstrips. Two versions are being built for military use: one is a light assault transport for cargo carrying; the second is the Arctic rescue plane. The Arctic version has provisions for four-man crew if radioman and navigator are needed. The *Raider* has top speed of 225+ mph

Special Purpose

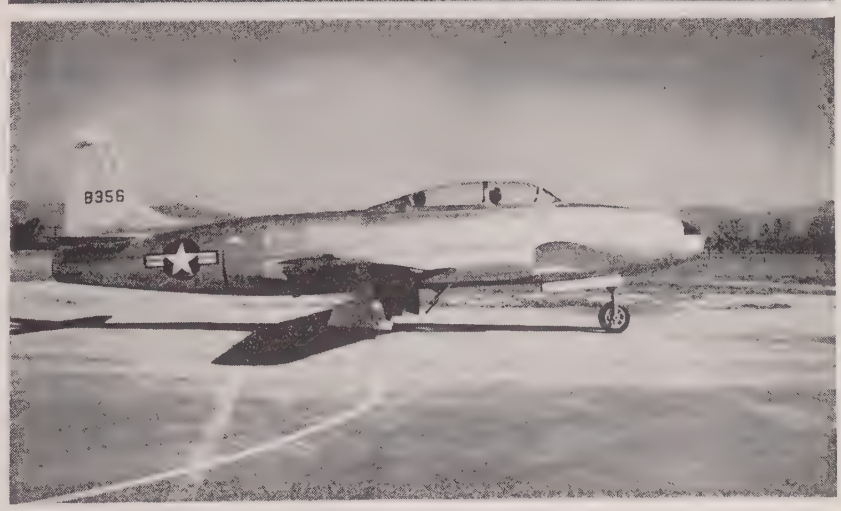
NO. AMERICAN T-6G—An advanced trainer, the T-6G is latest version of the famed T-6 *Texan*. Seating two in tandem, the T-6G offers better visibility from the rear cockpit than the earlier T-6. Instrument panels in both front and rear cockpit are the same, and complete radio control is provided in both cockpits. Powered by Pratt & Whitney R-1340 engine of 600 hp, the T-6G cruises at 146 mph, has range of 600 miles, ceiling of 24,750 feet. The plane's F-51-type landing gear is retractable. It has wing span of 42 feet, is 29 feet 5 inches long, 11.9 feet high

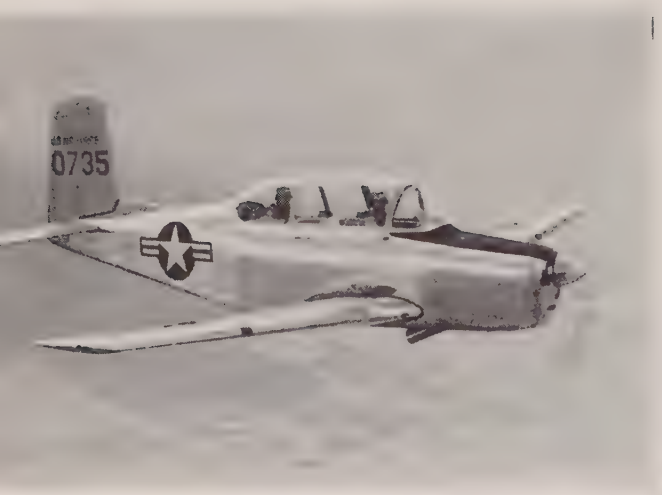
NO. AMERICAN T-28—Another advanced trainer is the T-28 which was designed to train pilots for ultra-high-speed jet aircraft. A two-place low-wing trainer, the T-28 is powered by a Wright R-1300 engine with a take-off rating of 800 hp. It has a top speed of 280+ mph, cruises at 190 mph, stalls at 72 mph, and has a service ceiling of 30,000+ feet. The T-28's maximum range is 1,008 miles. The plane's prop is an Aeroproducts two-bladed constant-speed. The T-28 has a wing span of 40 feet 1 inch, is 32 feet long and has an over-all height of 12 feet 6 inches. The T-28's tricycle landing gear is retractable



CONVAIR T-29—A navigator-bombardier trainer, the T-29 is powered by two Pratt & Whitney 2400-hp engines swinging Hamilton Standard propellers. A flying classroom, the T-29 is a military version of the *Convair-liner* used by many airlines. It has a top speed of 300+ mph and a service ceiling of 28,000+ feet (8,850 feet on one engine). The ship's take-off gross weight is 43,575 pounds; its fuel capacity, 1500 gallons. The T-29 has a wing span of 91 feet 9 inches, an over-all length of 74 feet 8 inches, and height over tail, 26 feet 11 inches. The trainer's rate of climb at sea level (1800 BHP/ENG) is listed as 1,495 feet per minute

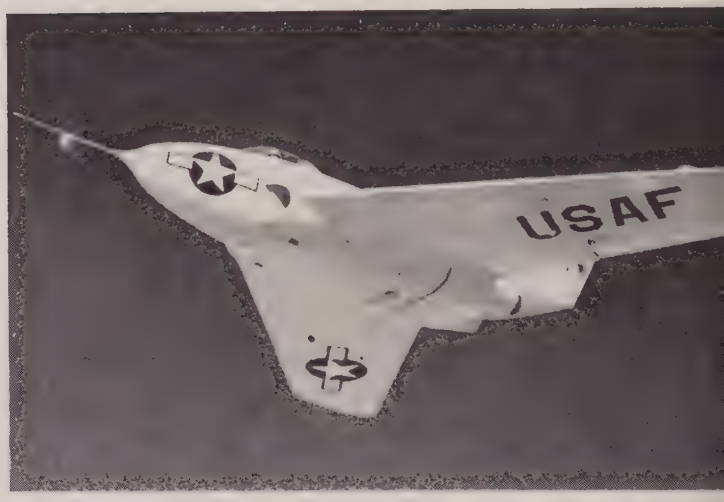
LOCKHEED T-33—The Air Force's jet trainer is this two-place version of the popular F-80. Powered by Allison J-33-A-23 turbojet engine rated 5200 pounds thrust at take-off, the T-33 has a top speed of 600+ mph, a stalling speed of 117 mph, a rate of climb of 5,525 feet per minute, and a service ceiling of 45,000+ feet fully loaded. The T-33's range is 1,345 miles. The wing span is 38 feet 10½ inches, is 37 feet 8½ inches long, and 11 feet 8 inches high. The plane has a fuel capacity of 683 gallons, and a tricycle retractable landing gear. The T-33 is only jet trainer presently in production for AF. Other data and specifications are still classified





BEECH YT-34—A two-place all-purpose basic trainer, the *Mentor* is powered by Continental E-185 engine with a take-off rating of 185 hp. The ship has a top speed of 170 mph, cruises at 160 mph at 10,000 feet on 60 per cent power, and has a range of 800 miles. The *Mentor* has a wing span of 32 feet 10 inches, is 25 feet 10 inches long, 9 feet 7 inches high; not in operational use

NORTHROP X-4 — Air Force research plane, the X-4 *(below)* is a miniature flying laboratory patterned after the Northrop *Flying Wing*. The bantam plane's wing is sweptback; tail consists of vertical fin and rudder, but no horizontal stabilizer. Elevons on wing act as both elevators and ailerons. The X-4 is reported to be powered by two Westinghouse J-30 engines. Tiny plane is 20 feet long



CONVAIR XF-92A—Called the *Delta*, the XF-92A *(below)* is an experimental research interceptor powered by an Allison J-33-A-29 turbojet engine with a thrust rating of 5200 pounds. Plane's delta wing has a span of 31 feet, plane is 41 feet long, 15 feet high. Gross weight of the XF-92A is 15,000 pounds. It has a retractable main gear and nose gear, has facilities for just a pilot. This ship was designed for high sub-sonic speed at altitudes over 40,000 feet. The delta wing has a sweepback of 60°. All other details, performance are restricted

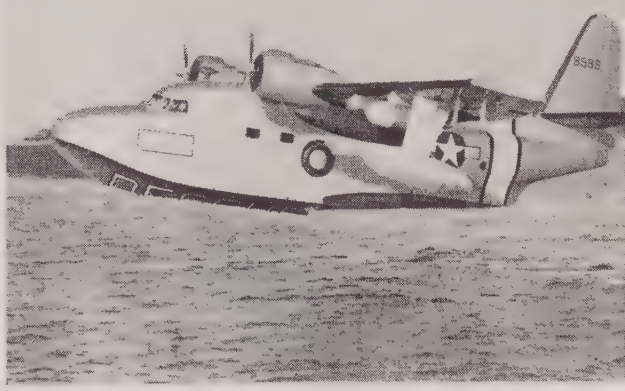
CON-VULTEE L-13—This aerial jack-of-all-trades is an all-metal liaison plane with folding wings and an adjustable landing gear to permit its being towed by vehicles on the ground or hauled in a truck. Powered by a Franklin O-425 engine of 245 hp, the L-13 has a top speed of 115+ mph, cruises at 92 mph, and has a landing speed of 43 mph. It has a service ceiling of 15,000 feet and a range of 368 miles; carries crew of two; is being used in Korea

STINSON L-5—Still in active service and presently being put to good use in Korea, the L-5 *(above)* is an observation plane of World War II vintage. It is powered by 185-hp Lycoming engine, has a wing span of 34 feet, is 24 feet long, and 7 feet 11 inches high. Feature of the L-5 is its jack-rabbit take-off and its ability to get in and out of small rough airstrips hastily built by Army under combat conditions. Many a rescue is credited the L-5

CESSNA L-19—Purchased by the Air Force for use by Army Field Forces, the Cessna L-19 is a liaison-observation-reconnaissance airplane powered by Continental E-190 engine rated at 213 hp on take-off. It has a service ceiling of 22,-900 feet, a range of 306 miles, and normal fuel capacity of 42 gallons. Gross weight of the L-19 is 2100 pounds, and its wing span is 36 feet, is a two-placer

RYAN L-17B—Employed as a liaison plane and personnel transport, the L-17B *(right)* is a four-place military version of the well-known *Navion*. It is powered by Continental 470 engine rated at 205 hp (maximum) and uses an Aeromatic or Hartzell variable pitch prop. It has a top speed of 150+ mph, a combat radius of 300+ miles, 900-mile range with extra tanks; a 11,000+ foot ceiling

GRUMMAN SA-16A—Called the *Albatross*, the SA-16A is an amphibian presently seeing lots of service with Air Rescue Service of the AF in Korea. Powered by Wright R-1820-76A engines, the *Albatross* has a cruising speed of 225 mph, a top speed of 247 mph, and a range (with extra tank) of 2700 miles. Its normal operating crew numbers 6, and it can carry as many as 12 litter cases plus crew. It has wing span of 80 feet, is 60 feet 8 inches long, 24 feet high. Navy version is UF-1



CESSNA LC-126—The Air Force and the Nat'l Guard have been using the LC-126 for search and rescue operations, and more have been ordered for Army Field Forces. Powered by Jacobs R-755A engine rated at 300 hp, the LC-126 has a top speed of 180 mph and cruising speed of 165 mph at 7,000 feet on 70 per cent of power. It has a service ceiling of 18,-300 feet and a range of more than 700 miles. The LC-126 can carry five

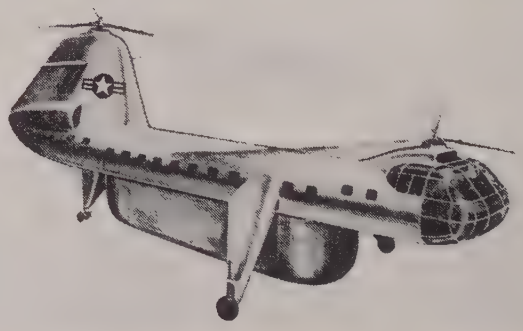
BEECH BONANZA—This airplane was being considered by Air Force for personnel and liaison duty. Powered by Continental E-185 engine, the *Bonanza (right)* cruises at 175 mph at 8,000 feet, has a service ceiling of 18,000 feet, and a maximum range of 775 miles without use of extra tanks. It is four-place high-performance airplane of all-metal construction and with retractable gear. It has a wing span of 32 feet 10 inches, is 6 feet high

HELICOPTERS

BELL H-12—Largest in the familiar Bell series of helicopters is the Air Force's H-12. It weighs about 7,000 pounds, has a cruising speed of 85 mph, a top speed in excess of 120 mph and, with its normal fuel capacity, a range of 500 miles. The H-12 can carry 10 persons and a pilot and has a useful load of more than a ton. It is powered by a Pratt & Whitney 600-hp R-1340. It can carry eight fully equipped infantrymen.

BELL H-13D—A three-place 'copter, the H-13D *(left)* is powered by a Franklin O-335 engine with a take-off rating of 200 hp at 3100 rpm. It has a top speed of 98 mph, cruises at 78 mph and has an initial rate of climb of 1,000 fpm. The H-13D has a normal range of 161 miles, and a gross weight of 2,202 pounds. It employs a single two-bladed rotor, 35 feet 1.5 inches in diameter. It has a cruising rotor rpm of from 322 to 360. In production

PIASECKI XH-16—Called the "world's largest helicopter," the XH-16 *(below)* is an all-metal tandem-rotored transport 'copter that features a detachable capsule which doubles the payload of the helicopter. The XH-16 can carry 25 persons, plus another 25 troops or 5,000 pounds of cargo in the detachable capsule. It is powered by two Wright R-1820 engines. Speed, range, etc., are restricted. We do know it is very long range



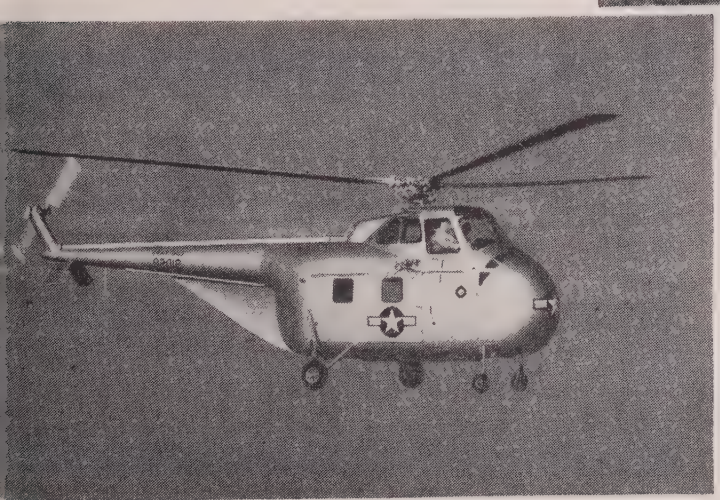
BELL XH-15—This two-place 'copter *(above)* is still experimental. Powered by a Continental XO-470-275 engine of 250 hp, it has a top speed of more than 100 mph, a service ceiling of 20,000 feet, and a combat radius of about 100 miles. It has a design gross weight of 2700 pounds; and is 43 feet long (includes rotor)

PIASECKI H-21—Designed specifically for Arctic Rescue work, the H-21 is a large, tandem-rotored all-metal 'copter *(right)* that can carry as many as 27 persons. It is powered by a Wright R-1820 engine with a take-off rating of 1,425 hp. The H-21 is reported to have a normal range of 610 miles and a top speed of 130 mph

HILLER H-23—This is the military version of the Hiller 360 helicopter. Called an evacuation-type helicopter, the H-23 is powered by a Franklin 6V4-178-B33 engine with a take-off rating of 178 hp. It is a three-placer and has a normal cruising speed of 84 mph. It has a range of 210 miles and a vertical rate of climb of 400 fpm (maximum rate of climb—860 fpm). Its service ceiling is 13,000 feet. The H-23 has a gross weight of 2400 pounds; an empty weight of 1,432 pounds and a useful load of 968 pounds. Swinging a single two-bladed rotor, 35 feet in diameter, the H-23 is 9.5 feet high (to top of rotor) and it is 38 feet long (tail rotor vertical). Experimental model is jet powered

SIKORSKY H-5F—This is the 'copter *(right)* that is called the "Guardian Angel" in Korea. A military modification of the four-place Sikorsky S-51, the H-5 evacuated 133 wounded and injured paratroopers in just two days of operation in Korea. The H-5 is powered by a Pratt & Whitney R-985-B4 engine with a normal rating of 450 hp at 2300 rpm at 2300 feet altitude. It cruises at 85 mph and has a vertical rate of climb of 200 fpm and a maximum rate of climb (sea level) of 1,000 fpm. It has a hovering ceiling (without ground effect) of 3100 feet, and a service ceiling of 13,500 feet. The H-5 has a design gross weight of 5500 pounds, and a useful load of 1695 pounds. It can accommodate two litters, rescue hoist, one attendant

SIKORSKY H-18—A four-place utility helicopter, the H-18 (*right*) is the military version of the S-52. Powered by a Franklin 6V6-245-B16F engine with a power rating of 245 hp at 3,275 rpm, the H-18 has a top speed of 118 mph, a cruising speed of 92 mph and a maximum rate of climb (sea level) of 1100 fpm. Its vertical rate of climb is 400 fpm, and its hovering ceiling (without ground effect) is 2£00 feet. It has a service ceiling of 12,500 feet, and a cruising range of 415 miles with standard fuel and reserve. The H-18 has a gross weight of 2700 pounds (maximum) and a useful load of 1,050 pounds. The H-18 has a main rotor diameter of 33 feet and is 27 feet 5 inches long. The H-18 has a normal range of about 306 miles



SIKORSKY H-19—The latest Sikorsky helicopter to go into operation in Korea is this H-19 (*left*). The H-19 is larger than the H-5 but was evolved from the H-5. It can carry 8 litter patients or 10 passengers. It normally carries a pilot and medical attendant during emergency evacuation or rescue work. It is powered by a Pratt & Whitney R-1340 engine which has a take-off rating of 600 hp at 2250 rpm. It has a top speed of 110 mph, cruises at 86 mph, and has a normal range of 462 miles. It has a gross weight of 6800 pounds and an absolute ceiling of 16,500 feet. Engine of the H-19 is located in the 'copter nose

U. S. Air Force Plane Facts and Figures

Mfg.	Desig.	Type	Crew	Powerplant	Horsepower or Lbs Thrust	Speed	Ceiling	Range or Combat Radius	Span	Length	Height
Beech	YT-34	Trainer	2	Cont. E-185-6	185 hp T/O	170 mph	18,000 ft	800 mi	32'10"	25'10"	9'7"
Boeing	B-29	Bomber	10/14	(4) Wright R-3350-57	2200 hp T/O	350 +	35,000 +	2000 + CR	141'3"	99'	27'9"
	B-47	Bomber	3	(6) GE J-47	5200 lbs each	600 +	40,000 +	1000 CR	116'	108'	28'
	B-47C	"	"	(4) All. J-35	.....	.....	.....	"	"	"	"
	B-50	"	11	(4) P&W R-3460	3500 hp each	400 +	40,000 +	2300 + CR	141'3"	99'	32'9"
Cessna	L-19	Liaison	1	Cont. E-190	213 hp (Max)	150	22,900	306	36'	25'	7'6"
	LC-126A	Rescue	1	Jacobs R-755A	300 hp	180	18,300	700	36'2"	27'4"	7'2"
Consolidated	B-36D	Bomber	11/15	(6) P&W R-4360 (4) J-47	3500 hp each 5200 lbs each	435 +	45,000 +	10,000 4000 + CR	230'	162'	46'9"
	XF-92A	Research	1	All. J-33-A-29	5200 lbs	.....	40,000 +	.....	31'	41'	15'
	T-29	Trainer	3	(2) P&W R-2800	2400 hp each	300 +	28,000 +	2500	91'9"	74'8"	26'11"
	L-13	Liaison	2	Frank. O-425-9	245 hp	115 +	15,000	368	40'5½"	31'9"	8'5"
Douglas	C-124	Transport		(4) P&W R-4360	3500 hp T/O	300 +	20,000 +	1100 CR	173'3"	127'1"	48'3"
	** B-26	Attack Bomber	3	(2) P&W R-2800	2000 hp T/O	350 +	25,000 +	900 + CR	70'	50'10"	18'6"
Grumman	SA-16	Rescue	6	(2) Wright R-1820	1425 hp T/O	247	26,000	2700	80'	60'8"	24'3"
Lockheed	T-33	Trainer	2	All. J-33-A-23	5200 lbs	600 +	45,000 +	500 + CR	38'10½"	37'8½"	11'8"
	F-80	Fighter	1	All. J-33-A-23	5200 lbs	600 +	40,000 +	500 + CR	38'10½"	34'6"	11'4"
	XF-90	Fighter	1	(2) J-34 plus afterburner	4000 lbs	High	.....	.....	40'	56'	14'
	F-94	AW Intercept.	2	All. J-33-A-33 plus afterburner	5200 lbs +	600 +	40,000 +	500 + CR	38'10½"	40'1½"	12'8"
Martin	XB-51	Bomber	2	(3) GE J-47, afterburner	5200 lbs	High	.....	1000 CR	55'	80'	20'
	* B-57	Tact. Bomber	3	(2) R.R. Avons	6000 lbs each	High	High	.....	64'	65'6"	15'7"
	XF-88	Fighter	1	(2) West. J-34	4000 lbs each	High	.....	.....	39'8"	55'	15'
					2000 lbs	600 class	40,000 +	Short	21'	15'	8'

North American	F-51	Fighter	1	Packard V-1650	1335 hp	450 +	40,000	2200 +	37′	33′4″	9′5″
	T-6	Trainer	2	P&W R-1340	600 hp	210	24,750	600	42′	29′5″	11′9″
	F-82	Fighter	2	(2) All. V-1710	1550 ea. hp T/O	400 +	40,000	1000 + CR	51′6″	39′5″	14′4″
	F-86	Fighter	1	GE J-47	5200 lbs	650 class	45,000 +	500 + CR	37′	37′6″	14′8″
	F-86D	AW Intercept.	"	J-47, afterburner	5200 lbs	650 +	45,000 +	.....	37′	41′	14′
	F-86E	"	"	J-47, afterburner	Same as earlier models except for variable incidence tail						
	YF-93A	Penetration Fighter	1	P&W J-48, afterburner	6250 lbs	.....	.....	.....	39′	44′	16′
	T-28	Trainer	2	Wright R-1300	800 hp T/O	280 +	30,000 +	1008	40′1″	32′6″	12′6″
	B-45	Bomber	4	(4) GE J-47	5200 lbs each	550	40,000 +	800 + CR	89′6″	75′	25′
Northrop	F-89	AW Intercept.	2	(2) All. J-35	4000 lbs	600 +	40,000 +	600 + CR	50′	50′	15′
	X-4	Research	1	(2) West. J-30	.....	.....	.....	.....	25′	20′	15′
	C-125	Transport	2/4	(3) 736C9HD(NM)	1425 hp each	225 +	25,000 +	850 + CR	86′6″	67′1″	20′7″
Republic	F-84E	Fighter	1	All. J-35-17	5000 lbs	600 +	45,000 +	850 CR	36′5″	37′3″	12′10″
	F-84F	Fighter	1	All. J-35-25[1]	5200 lbs	600 +	45,000 +	.....	34′	38′	14′
	XF-91	Intercept.	1	GE J-47, afterburner	5200 lbs	High	High	.....	30′	45′	18′
Chase	YC-122	Transport		(2) P&W R-2000	1350 hp T/O	220	23,000	1000	86′4″	56′7″	21′3″
	XC-123	Transport		(2) P&W R-2800	2100 hp T/O	225	22,000	750 CR	110′	77′1″	32′8″
Fairchild	C-82	Transport	4	(2) P&W R-2800	2100 hp	250	30,000	2400	106′6″	77′1″	26′4″
	XC-119	"	4	(2) P&W R-4360	3250 hp each	250 +	30,000 +	1100 CR	109′3″	85′10″	26′8″
	C-120	Packplane	5	(2) P&W R-4360	3250 hp each	Comparable to C-119			109′3″	85′	27′
Stinson	L-5	Liaison	1	Lycom. O-485	185 hp	130 +	16,000 +	160 + CR	34′	24′1″	7′11″
Ryan	L-17B	Liaison	1	Cont. O-470	205 hp T/O	150 +	11,000 +	300 + CR	33′5″	27′6″	8′8″

[1]—Prod. model to have J-65

**—British Canberra, to be built by Martin*

***—Formerly A-26*

****—Will not go into production*

CR—Combat Radius

T/O—Take-off

All.—Allison

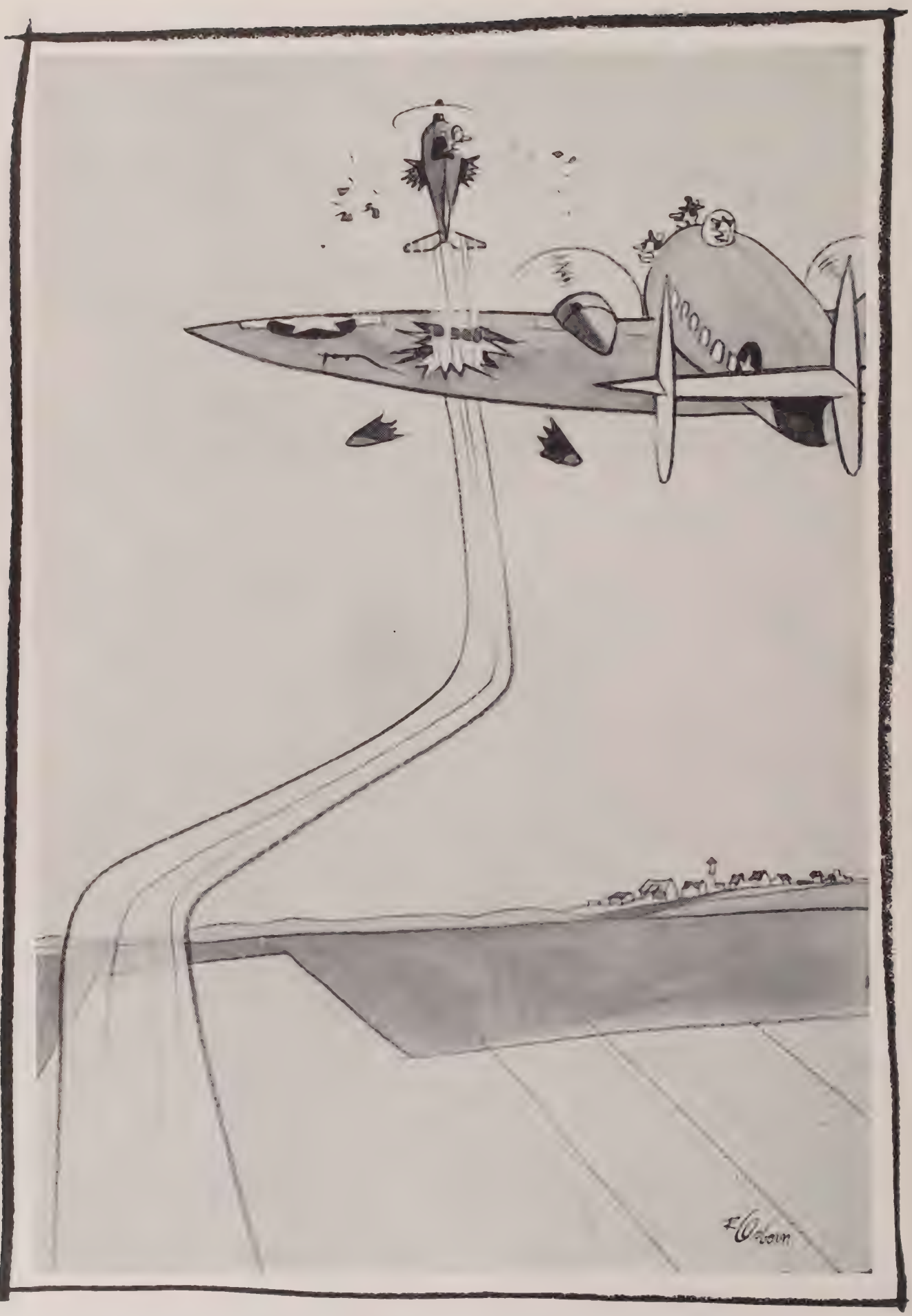
P&W—Pratt & Whitney

R.R.—Rolls Royce

GE—General Electric

West.—Westinghouse

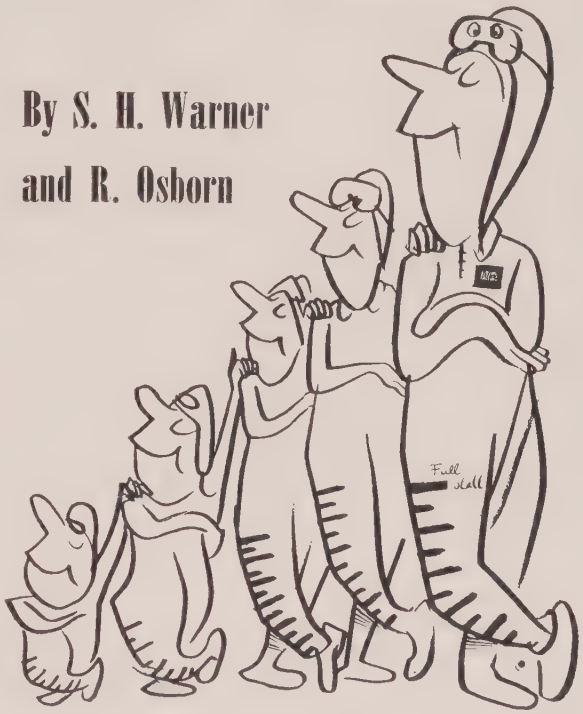
(NM)—No Military Designation



"Head that neglects to look around is doomed to hard knock on the ground"

DILBERT

By S. H. Warner and R. Osborn



Dilbert's Dilbert—Believe it or not, Dilbert is an excellent instructor. The reason is that he has made just about every mistake in the book, so when he advises his students, it is with the voice of experience. Most of his warnings are heartfelt remembrances, earnestly delivered—with gestures.

All of which is merely by way of introducing a prize boner pulled by one of his students. To make matters worse, Dilbert had been bragging about the lad. It will be many moons before Dilbert's fellow instructors will let him forget this one.

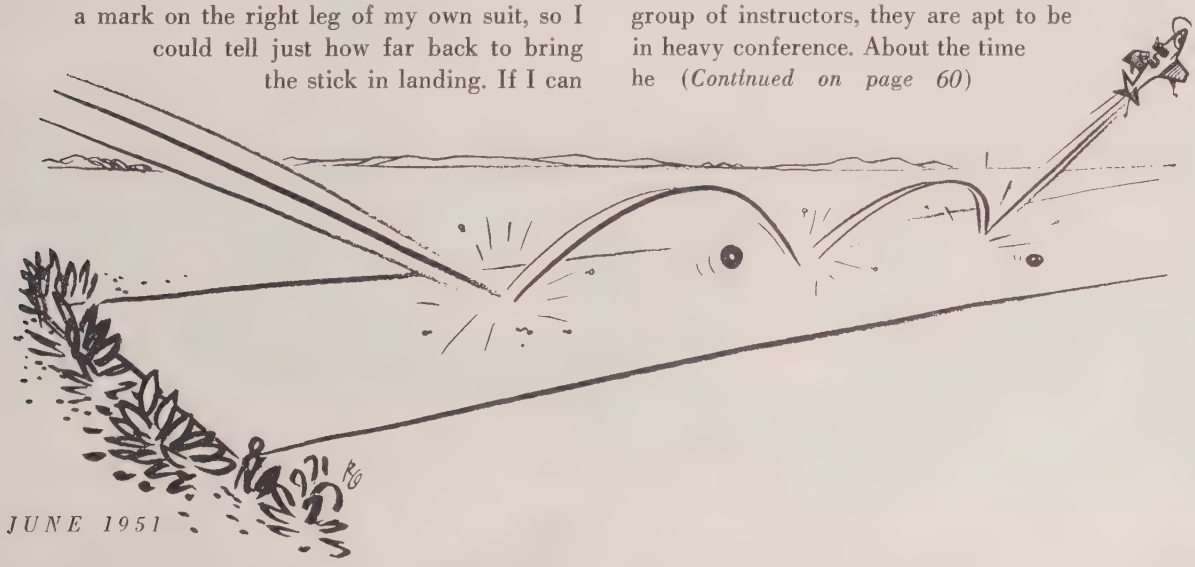
To begin with, this student's solo check was one of the shortest on record. When the Chief Instructor brought him back to the line, he (the C. I.) lit into Dilbert. "I thought you said this man was ready for solo. I never saw one less ready. He can't land for sour apples!"

That's when the student jumped to Dilbert's defense. "It was all my fault, sir. I'd have made it, but somebody swiped my flying suit."

Both Dilbert and the C. I. gulped and stared. The student was wearing a perfectly good flying suit. Glibly, he continued.

"Not this suit; I borrowed this. You see, sir, I had a mark on the right leg of my own suit, so I could tell just how far back to bring the stick in landing. If I can just find my suit, I'm sure I can pass this check, easy."

Now, whenever Dilbert approaches a group of instructors, they are apt to be in heavy conference. About the time he (*Continued on page 60*)



CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

Functional Panel

J. I. Case Company engineers have worked out an instrument panel for the two Twin Beech aircraft operated by the company, which their pilots claim has resulted in reduced fatigue, and which also is highly suitable when flying without a co-pilot.

In working out the instrument arrangement they took into account the recommendations of the Standardized Panel Committee of the CAA Air Navigation Development Board, and all of the facts and information which they determined from both practical and psychological considerations. They also concluded that the instruments should be arranged for maximum efficiency during the most critical part of instrument flying—final approach.

(1) Air Speed, ILS and Gyro Horizon were given top priority for the critical condition, and were located in the upper row directly in front of the pilot.

(2) Altimeter, Directional Gyro and Rate of Climb are also grouped as close together as possible and are also directly in front of the pilot.

(3) Marker Beacon indicator lights are located directly below the ILS cross-pointer indicator so as to avoid the possibility of the pilot not seeing the Outer, Middle and Inner Markers in case the audio circuits of the Marker Beacon were shut off, or as might happen if the MB indicators are located out of the field of vision when the pilot is concentrating on the ILS indicator.

(4) Immediately adjacent to the flight group are the engine control instruments. It was felt important that the pilot be able to monitor the engine instruments, even though this responsibility may be delegated to a co-pilot.

(5) The two indicator lights below the Rate of Climb and just left of the Omnirange Course Selector are for vacuum pump inoperative warning. It was considered very important that the pilot be notified immediately in case of failure of vacuum-pump operation, as this would affect the operation and reliability of the entire flight group on the left-hand side. A desirable safety measure is to use standby electrically driven instruments on the right hand side of the panel.

(6) Slightly different arrangement on the right side is for the purpose of locating the Gyro Horizon and Directional Gyro in such a position that the airplane could be flown in an emergency using these instruments from the piolt's seat. These two instruments also happen to be the control units for the Lear L-2 Autopilot, and therefore not only serve as flight indicators but also function as control units in the Autopilot system.

New Members

During the first month at the Washington headquarters applications from eight operators of company aircraft were accepted. The total CAOA fleet now stands at 273 aircraft, of which 198 are multi-engine. Here are the details on seven of the companies, one having been reported in the May issue:

Great Lakes Carbon Corporation, with head office in New York, operates three Douglas airplanes—a DC-3, a B-23 and an A-26, all based at the Bridgeport (Conn.) Airport. Matthew Springer (ATR) is the chief pilot.

Kudner Agency, Inc. (advertising) of New York acquired its Douglas DC-3C last fall, also based at Bridgeport. L. R. Titman is Asst. Secretary and Robert K. Smith (ATR) is chief pilot.

Vulcan Lead Products Co., Inc., Milwaukee, obtains an annual utilization of between 600 and 700 hours on its Beechcraft A-35 *Bonanza.* Company president and pilot is Rex G. Conklin.

The Ohio Oil Company of Findlay, Ohio, operates four Twin-Beech D-18's, two Cessna 195's, four Beechcraft *Bonanzas* and two Piper *Clippers.* Six of these planes are based at the Findlay Airport, the rest are located in Indiana, Illinois, Oklahoma, Texas and Wyoming. Michael C. Murphy is Manager of the Aviation Department.

George R. Galbreath, real estate operator of Columbus, Ohio, uses a Beechcraft D-18-S in connection with his business. Robert H. Coffey is the pilot.

The Colvis Company of Charlotte, N.C. a Myrtle Beach, S.C., distributes depa tm store merchandise and operates a chain department stores. The company uses a Bee craft B-35 *Bonanza* and Cessna 170, b based at Cannon Airport, Charlotte. Willi A. Collins is Board Chairman and Treasur and will represent the company at CA meetings.

Texas Eastern Transmission Corporation Shreveport, La. and Houston are in the bu ness of gas transmission and sales. The c poration operates a Douglas DC-3, Lockhe *Lodestar,* Beechcraft D-18-S and *Bonanza,* based in Shreveport. E. C. Aldridge is sec tary of the corporation and Jim Ketner, (ATR) is the chief pilot.

CAOA on RTCA Executive

At the Spring Meeting of the Radio Te nical Commission for Aeronautics, by una mous action the Corporation Aircraft Own Association was invited to become a memb of its Executive Committee. The invitati was accepted at the April meeting of CAO Board of Directors.

The action is effective July 1, 1951, and addition to the financial responsibilty assuming a share of the annual cost of ma taining the RTCA secretariat, publication technical and operational reports, etc., t Association, through its chairman of t Technical Committee and its Executive S retary, will represent company aircraft int ests in the development of the Comm System of All-Weather Air Navigation, Lan ing Aids and Air Traffic Control.

Annual Meeting & Forum

The annual meeting of the Association h been set for June 7, 1951 at the Hotel Statl Washington. The Fourth Annual Forum w be held on the following day, Friday, Ju 8th. An interesting and informative progra has been arranged, keyed to present em gency conditions, and a good turnout of re resentatives from member and non-memb companies is anticipated.

At the Forum luncheon meeting the annu CAOA Award will be presented to Colonel Francis Taylor, Jr., chief of the All-Weath Flying Division, Air Matreiel Command.

The program and other details will be se out early in May. Prompt replies will appreciated, so that final arrangements m be made.

FUNCTIONAL PANEL was developed by J. I. Case Company for its two Twin Beech exe tive planes. Pilot claims the new instrument panel set-up does much to reduce pilot fatig

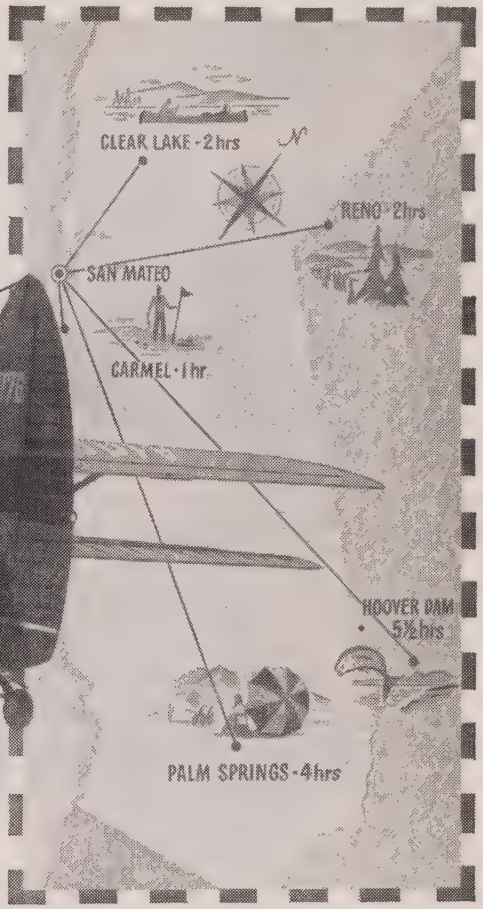
PLANE FAX

Ideas for weekend vacations

from **SAN MATEO AIRPORT** California

LEGEND:

Hours indicate the approximate time it takes a light plane (such as a Cessna) to fly from San Mateo to the resort airport.



Have more fun flying this summer!

Ed Watson

"Plan your next vacation by air and you'll save money, avoid traffic and have more time for swimming, playing, relaxing and sight-seeing," writes Ed Watson, manager of San Mateo airport. "For about $6.50, two people can fly their own light plane, such as a Luscombe from our field to Palm Springs—in only four hours! That's a whale of a lot cheaper and quicker than a car or train.

Where to fly for a wonderful weekend

"Dozens of marvelous fishing and vacation spots are only an hour or two from most Western airports. Ask your local airport dealer for suggestions, then round up an inexpensive sleeping-bag party. Our fellows fly from Standard-stop to Standard-stop so they can use their Chevron National Credit cards, save cash at home and be sure of getting complete Standard Oil products and services.

Summer flying suggestions

"With hot weather coming on, remind yourself *not* to warm-up too long—which might overheat cylinder heads and burn your valves.

Another good rule is to stick to Chevron 80/87 Gasoline and RPM Aviation Oil, and reduce your maintenance costs. Since using this new gas and 'RPM,' we've increased our overhaul period from 600 hours up to 1300-1500 hours."

TIPS OF THE MONTH—VACATION FLYING

One good idea is to know all about your airport. Any special landing instructions? It's always embarrassing to get there—and find out it's closed that season!

Then the old petrol problem: got enough gas to get you to an alternate airport if the resort airport is socked in?

It pays to remember this old rule, even on the best of days: check weather before taking off.

Ed Watson, Manager

"Killer Jet" in Korea

(*Continued from page 12*)

would be somewhat faster and mount greater fire power. Current armament of the MIG-15 is believed to be at least two 37-mm cannon, plus two 23-mm guns in the wings. It is powered by a *Sare* 1 adaptation of the British Roll-Royce *Nene* or *Derwent* engines, another attribute to the Russian's ability to copy.

Pilots who have encountered the MIG believe it is equipped with some sort of rocket boost, afterburner, or water-injection system for giving it extra bursts of speed when necessary. They describe it as very fast with a very high rate of climb, and claim it has no difficulty in showing its heels to jets in the F-80 *Shooting Star* class. The big unanswered questions to date are 1) who is piloting the MIGs, and 2) why are they being used in the Korean war?

The seeming timorousness of MIG pilots to enter aerial combat despite the airplane's ability, and the fact that the MIGs never penetrate far enough south to be caught behind the United Nations' lines, thus compromising a downed airplane, would indicate that they are being flown by expert Russian pilots whose aim is to thoroughly test the airplane under actual combat conditions. This practice was followed by both Italy and Germany during the Franco War in Spain. On the other hand, if the MIGs are being flown by either Red China or North Korean pilots, both relatively inexperienced with jets, the impressive victories rolled up by the F-86 *Sabres* to date may hinge largely on this fact.

But these unknown factors fail to impress U.S. pilots who fly the *Sabres*, or American observers who have watched them in action against the Russian flying "question marks." Major General Emmett "Rosie" O'Donnell, Commander of the 15th Air Force, does not subscribe to the theory that the MIG pilots are holding back merely to prevent compromising an airplane. "They're scared to death of our F-86's," he said after a recent visit to the Korean Theatre. "The F-86's are doing a splendid job. The MIGs want no part of our fighters."

As the recent Commander of the Far East Bomber Command, Gen. "Rosie" O'Donnell's opinion is well versed on Red psychology. But whether the MIG pilots are scared, or whether they are holding back for a more impersonal reason, Red "victory" stars continue to sprout on F-86 cockpits in the Korean Theatre. The "brain child" of Russia's two top jet designers, Artem I. Mikoyan and Michail I. Gurevich (from whose initials the name "MIG" was coined) either can't compete with the *Sabres*, or has yet to show what it can do.

They "couldn't" on December 30, 1950. That day rang in the biggest jet battle of all time. Fifteen *Sabres* cruising somewhere along the Yalu River were suddenly set upon by 40 MIGs that swept down on them out of the North Korean sky. The Reds were in an ideal position for the kill—high and on the tail. No one is sure exactly what occurred as it is humanly impossible to get a composite view of 55 supersonic projectiles all in action at one time. But piecing the picture together after the fight was interesting. In a matter of seconds, six MIGs were shot down, while a seventh fluttered toward the Korean rice paddies tra ing smoke. The 15 *Sabres* continued on the interrupted course.

Col. Hinton scored another MIG in th fight. A Navy flyer, Lt. Cdr. Paul Pug flying a *Sabre* with the Fifth Air Forc scored also. It was Pugh's second MIG. H had downed another on December 22, b coming the first Navy flyer to accompli the feat. Pugh's wing man, James Jaba of Wichita, Kansas, was credited with "probable." "I fired two long bursts in his fuselage and wing root," Jabara sa "When I left him at 1500 feet, he was u side down, smoking and in a steep dive

After this battle, even the Navy co mented on the ability of the Air Forc *Sabres*. "The Soviet-made MIG-15 swep back jet fighter is better than any oth American airplane *except the Sabre*," is remark credited to Vice Admiral John Cassady, Deputy Chief of Naval Operatio for Air.

What the *Sabres* did to the Russian MI in this first major air clash echoed ev in the halls of Congress. The Honorab Gerald R. Ford, Jr., of Michigan, quot on the floor of the House of Representativ the Associated Press dispatch covering t battle, and had the entire dispatch reprint in the Congressional Record in order th "all may read of this accomplishment the air over Korea by our F-86 *Sabres*."

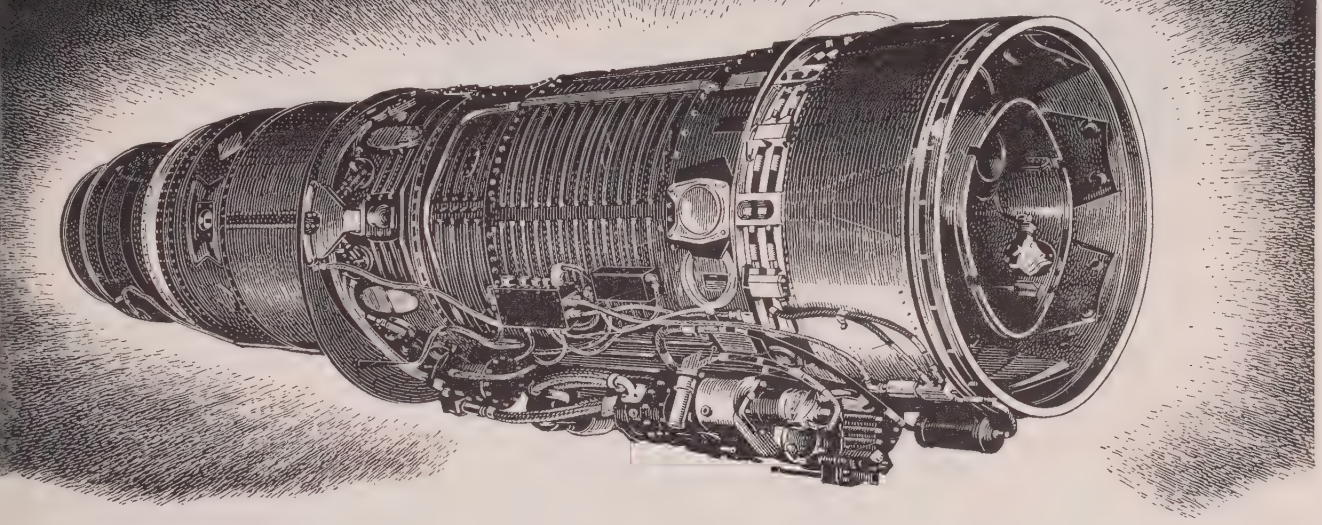
One *Sabre* was shot down and compr mised to the enemy on February 6, 19 so it is now possible to reveal the full arm ment carried by the American "killer" je Six .50-caliber machine guns are locat in the nose of the fuselage. Mounts for five-inch rockets are provided for low-altitu ground-support work. The inboard rac provided for two external fuel tanks can used also for carrying other and vari armament loads.

The F-86 is powered by a General Elect J-47 engine delivering 5200 pounds of thru It is the first U.S. operational fighter a plane to incorporate the swept-back pr ciple to reduce buffeting and loss of cont when gaining speed or decelerating throu the transonic velocity range. The 37-f wings are swept back 38° from the fusela compared with a sweep-back of 40° on t MIG-15. The vertical stabilizer sweeps ba at 40°, while the same part on the M bows 60° from the vertical. The *Sabr* length is 37 feet, compared to the MI 32 feet, while the spread of the tape and swept-back horizontal tail surfaces 13 feet against the MIG's 10 feet. Gr weight of the *Sabre* is 13,715 pounds, w a service ceiling of well over 40,000 f and a tactical radius exceeding 800 mi

The auxiliary fuel tanks on the *Sa* fit inboard under each wing and are signed to comply with the general ae dynamic contours of the airplane. T location and super-streamlining of the ta makes it unnecessary to drop them dur combat maneuvers unless the last ounce top speed is required. The wings are tremely thin and of sandwich-type constr tion in which the structural materials laminated between inner and outer tape skins. A single straight ram duct loca in the nose of the airplane follows the p tern introduced by North American's f jet airplane, the Navy FJ-1 *Fury* carr based fighter. The cabin is pressurized un

(*Continued on page 48*)

Allison Wins Record U.S. Air Force Contract for Super-Jet Engines



New Turbo-Jet Leads with Greatly Increased Power and Fuel Economy

NCE more Allison makes a major contribution to America's air power—a new Super-Jet aircraft engine at excels in power and fuel economy any other jet engine er released for production.

's the new J35-A-23 developed in cooperation with the ir Materiel Command—a completely new design—yet taining the same basic diameter of the famed J35 series. his new engine develops more power per square foot of ontal area than any other jet yet produced. Four of these w engines will be installed in the YB-47C Boeing Strato- t. They will produce more power than the six jet engines w used in previous models of the B-47 series.

his J35-A-23 now has been selected by the r Force—in open competition—for a record- e production contract. Behind this latest ard is Allison's unequaled experience in e design and production of more than ,000 jet engines with total time in the air over 700,000 hours.

This accents the length and breadth of Allison jet engine experience where it counts most—in the air. Many of these flight hours have been accumulated in Korea powering U. S. fighters for support of ground troops and keeping the skies clear of enemy opposition.

Production will continue at Allison on those combat-proved types of jet engines in addition to the new J35-A-23 Super-Jet and the new T40 Turbo-Prop engines.

The record production order for the new Allison engineered Super-Jet will be met through the combined facilities of Allison and the Chevrolet Motor Division which will build a substantial quantity of these Super-Jets.

GM
GENERAL MOTORS

Builders of J35 Axial, J33 Centrifugal Flow Turbine Engines and T40 Turbo-Prop Engines

Allison

DIVISION GENERAL MOTORS CORPORATION
INDIANAPOLIS, INDIANA

DEFENSE IS EVERYBODY'S BUSINESS—AIR POWER IS EVERYBODY'S PROTECTION"

"Killer Jet" in Korea

(*Continued from page 46*)

a bubble canopy, and a cartridge-ejection type pilot's seat is installed. The airplane's tactical effectiveness is enhanced by the latest radio, radar and navigational aides.

Prior to its entry into the Korean war, the *Sabre* had accumulated a backlog of speed accomplishments that set it apart from other U.S. jet fighters. In an early model F-86, on September 15, 1948, Major Richard L. Johnson of the Air Materiel Command, flying a *Sabre,* flashed to a new official world's speed record over Muroc Dry Lake in California at 670.981 mph. The F-86 was carrying a full load of guns and ammunition at the time.

A bit later, Captain Richard D. Creighton of the 71st Fighter Squadron set a new official inter-city record when he streaked from San Francisco to Los Angeles in 32 minutes and 56 seconds, averaging 625 mph for the 341-mile trip. An unofficial speed record of 710 mph was set on February 11, 1949, by Air Force pilot Major Frank Everest, flying a *Sabre* from Dayton to Washington, D. C., in 33 minutes and 3 seconds on a routine operational flight.

North American completed its initial contract for F-86A *Sabres* late in 1950, and now has in production two improved versions of the sleek airplane, the F-86D all-weather interceptor, and the super-controlled F-86E with an "all-flying" tail. The "all-flying" tail feature incorporates hydraulically boosted operation of the horizontal tail surfaces with a feed back of synthetic control "feel." The horizontal stabilizers move in conjunction with the elevators to eliminate the necessity of applying stabilizer trim for control through the transonic velocity ranges.

The blazing speed of the *Sabre* is undoubtedly partly responsible for its impressive string of Korean victories over the MIGs, though experts in aerial combat maneuvers admit that no definite pattern for jet combat has developed to date. Most of the encounters with MIGs have been in the form of lightning-fast passes of fractional second duration. If and when the MIG pilots become more willing to stay and fight, prolonged combat maneuvers are still to be worked out.

But viewing the situation as it now exists, and based on past records, there is no doubt that the F-86, with a good pilot, is a top military fighter airplane. In addition to high-altitude combat, its controllability at low levels and its facilities for toting 16 five-inch rockets have made it useful in ground-support work. The attention given by North American designers and engineers to pilot comfort and safety is now paying dividends in one of the most vital of war necessities—high morale.

General Hoyt S. Vandenberg, Chief of the U.S. Air Force, had this to say regarding the airplane—"The North American F-86 *Sabre* has been acclaimed by its pilots as the best fighter they ever flew. It is the first new plane I ever heard of that pilots didn't have some complaint against. If you know pilots, that's something!"

Trim Tabs: Easy Flying

(*Continued from page 17*)

airplane is like walking a tightrope with ju half a balance-bar. Or driving a truck wit all the load on one side. It may even b likened to riding a Model "T" up a steep hi with all the weight in the back end. It ca be done, but it's tough.

When the pilot fails to trim his airplan he has to fly it through every maneuver. Th plane cannot fly itself. This means fatigu and loss of proficiency. Lack of trim ca spell sloppy or dangerous take-offs, har landings and higher maintenance costs. Let analyze a few procedures of flying and se how trim can help our over-all technique.

Consider the matter of take-off. After ou first few flights, we realize that old ma torque is a powerful fellow. Almost uncon sciously, we form the habit of using right rud der on take-off. Try a bit of right rudder tri —just past neutral. One or two experimen with the plane you are flying will establis the right amount. And you will find that th rudder tab is a great help in controlling tha huge surge of power used on take-off.

Once in the air, many pilots fail to tri the airplane for climb. Could it be charte on a graph, the climb pattern of some flight would resemble the ups and downs of roller-coaster. I'll never forget one of my firs rides with a veteran instructor. He put th ship in a climb and settled back to smoke cigar—hands off the controls. When I trie it, the plane acted like the south end of bucking bronco. Then he laughed and sai "Trim it, son. Trim it." After that it wa easy.

Here's how you do it. Put the ship in th climbing attitude you wish to maintai Then, using finger-tip pressure to hold th plane in that position, adjust the elevator ta until the pressure on the stick disappear It is as simple as that. Flying hands of make similar corrections for rudder an aileron.

If the climb is to continue for any appr ciable time, a few adjustments must be mad One is related to the throttle. Increased alt tude, of course, will reduce engine powe And when the throttle is advanced to com pensate for this loss of power, a re-trim wi be necessary. Make a mental note here: *eac time the throttle is adjusted, the trim mu be changed.*

Further related to increased altitude is th matter of lift. In order to continue the clim the plane's angle of attack must be co stantly increased to allow for the lowere density of the air. Slight elevator-trim adjus ments from time to time will help her When the desired altitude is reached, simp re-trim for straight-and-level flight.

Straight-and-level flight affords a good o portunity to check the inter-relation of co trols and trim tabs. Try the following pr cedure:

Trim for straight-and-level flight by fo lowing the same steps you used in trimmin for climb. Use the tabs to relieve pressu on the controls. Then increase or decrea the power. Notice that an adjustment of a three trim tabs must be made if straight-an level flight is maintained.

This interdependence may be proved a other way. After trimming for straight-an level flight, make a slight change in the s

(*Continued on page 50*)

Trim Tabs: Easy Flying

(*Continued from page 48*)

ting of the elevator tab (in either direction). Note that rudder and ailerons must be trimmed if the wings are to remain level and the nose straight.

Simple as this matter may seem, there are some pilots who insist upon making it difficult. Myself, for instance. I was a proud penguin after I discovered how to use the elevator tab. But I guess I forgot about the rudder. One day I flew clear across Florida and back holding right pressure on the rudder. That little metal strip on the tail would have been a big help, had I used it!

Rudder trim seems to cause more confusion than it should. Its use need be no more difficult than adjusting the other tabs. In addition to removing control pressure, check the ball in your turn-and-bank indicator. If the ball is out of center, trim must be applied to the same side as that on which the ball lies. When the ball is centered, the ship is trimmed. Use the directional gyro, too. If it tends to creep more than the amount caused by precession, the ship needs additional trimming.

While acting for awhile as an instrument instructor, I once ran across a student who demonstrated unusual aptitude in blind-flying technique. And a few minutes' observation told me why. He was extremely trim conscious. In every turn, in every climb, in every maneuver, he adjusted the trim tabs. He had learned that the airplane could do a much better job of flying than he could *if* he kept it trimmed.

A surprising number of flyers sweat and labor through turns without ever correcting for trim. I knew a chap once who invariably lost from 200 to 500 feet during every turn. He knew, as does every pilot, that a turn requires more back pressure. Trim will make for smooth turns, and without that consequent loss of altitude. Fuel consumption, cargo changes and shifting passenger loads call for constantly changing trim. Trim makes for the easy ride and the polished pilot. Take the case of the fine instrument flyer mentioned above.

Let's assume that your instrument experience yet lies ahead of you. Don't forget those trim tabs. But even before you qualify for your instrument license, you may be called upon to make use of instrument procedures. It has happened before. Here is the most common example.

You are out flying one day when you find yourself caught on top of an overcast. Your fuel is running low so you haven't time to hunt for a way down through clear air. You must make an instrument let-down. It's that or else.

Really, it's quite easy. Just a climb—in reverse. Remember what we said about trimming the ship up for hands-off flight? Same thing for the let-down. Starting well above the cloud formation, throttle back. Use back pressure to establish a moderate rate of descent. Two hundred feet a minute is good. I prefer to use the clock and the altimeter rather than the rate-of-climb.

Once your descent is established, use trim to remove control pressure. That's all there is to it. The built-in stability of modern airplanes is simply marvelous. Don't worry about going into a spiral or flipping on your back or a hundred other things. If the plane is trimmed, she will fly down through tha cloud a thousand times better than you o I or anyone else could do it. Forget abou the thunderheads. It isn't likely that you'll b playing "King of the Mountain" on top o a 40,000 foot cumulo-nimbus.

Forgive me one suggestion in regard to th let-down. I trust you will get out and do a few fair-weather trials first. Then, if you d get caught on top of the soup, both you an I will feel much better for your having proved to yourself that it can be done.

After experimenting with trim for leve flight, climbs, and let-downs, try trimming for simulated landing glides. This, of course will call for wheels and flaps down. Learn the feel of the ship under these conditions Notice that, as the flaps go down, the nos must be trimmed correspondingly. I have seen fellows literally fight to hold the nos down when they lowered flaps.

In these simulated landing glides, adjus throttle settings. Observe that a proper trim will keep the plane in a beautiful glide—hands off. One of the most perfect landings I have ever witnessed was made by a friend who "put 'er on the ground" without ever touching the stick. Literally.

He and I had been out fooling around in a new ship. It was my first trip up in the thing, but he had chalked up several dozen hours in it. Try as I would, I couldn't make a decent landing. Either I would round out too soon or too late or in some other equally disconcerting way.

It was too much to admit that I couldn't fly the airplane, so I said, "I don't think you can make a good landing in this kite."

My friend replied, "O.K. I'll show you It lands itself."

On the final approach, he put down his wheels and flaps and trimmed it up. For the elevator trim tab the airplane had a wheel control which was in an extremely accessible spot—right between the seats.

As we approached the ground, my friend said, "Watch now . . . I'm going to land by using the tab alone." And he did. Solely by use of the elevator trim, he rounded the plane out, held her off and stalled her three point. Right out on the ground. That con vinced me, but it didn't help my pride.

Try the trim tab for landing. You may no care to use it as completely as did my friend but a careful use of the elevator trim on the way down will give you a steady approach and a much nicer landing. One word o warning: in case of a go-around, don't for get to wind the tab forward. Otherwise, ap plication of sudden power might shove you nose up higher than a recruit on furlough.

Now for a final word—if you are not ye a night-flying addict, you will be. To me night-flying represents the ultimate in avia tion. But night-flying has its dangers to avoid its warnings to heed. The senses are not s keenly oriented, nor the vision so acute a night. Poor trim and faulty flying may b excused in the daytime. Not always so a night. I have seen planes lurch from the run way and crash into parked aircraft at nigh without ever leaving the ground. Faulty rud der trim.

At no little expense, the manufacturer o the airplane you fly has added a feature t make your flying a delight and pleasure the trim tab. You can get along withou using it, but take it from pilots who hav traveled the long, pleasurable road of aeria travel—trim tabs make flying easy.

Here are figures to prove a

PIPER PACER

is a business necessity

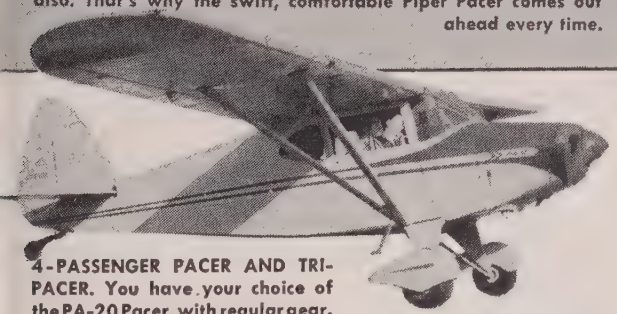
In these critical days when so much must be done so quickly, savings in traveltime are important. When time saved means money saved as well, that's all the more reason why the 4-passenger Piper Pacer . . . a time- and money-saver if there ever was one . . . has become an essential piece of equipment for many business firms.

TABLE I. COMPARATIVE COSTS FOR 50,000 MILES

	AUTOMOBILE @ 6¢ per mi.	RAIL @ 5¢ per mi.	PIPER PACER @ 6.5¢ per mi.
Mileage Cost	$ 3,000 (for 1 or 5)	$2,500 (for 1)	$3,250 (for 1 or 4)
Personnel Value*	6,250 (for 1)	5,000 (for 1)	2,000 (for 1)
Personal Expense**	1,560 (for 1)	1,250 (for 1)	500 (for 1)
Total Travel Costs	$10,810	$8,750	$5,750

*Personnel value is figured conservatively at $5.00 per hour times traveltime. Average speeds are figured at 50 mph for train; 40 mph for auto and 125 mph for Piper Pacer.
**Personal expenses are figured at $10 per day.

Quite often the cost of transportation itself is the least important. Executive time and out-of-town expenses must be figured also. That's why the swift, comfortable Piper Pacer comes out ahead every time.



4-PASSENGER PACER AND TRI-PACER. You have your choice of the PA-20 Pacer, with regular gear, which cruises 125 to 134 mph, depending on propeller; and the PA-22 Tri-Pacer with tricycle landing gear, steerable nose wheel and inter-connected controls for maximum flying ease. Standard equipment includes new Piper Duraclad plastic non-flammable finish. Write for colorful Pacer brochure, Dept. K-6.

TABLE II. ANNUAL COST COMPARISON

MILEAGE	AUTOMOBILE	RAIL	PIPER PACER
20,000	$ 4,320	$ 3,500	$3,320
30,000	6,490	5,250	4,920
40,000	8,650	7,000	5,040
50,000	10,810	8,750	5,750
60,000	12,980	10,500	6,480
70,000	15,140	12,250	7,350
80,000	17,300	14,000	8,120
90,000	19,470	15,750	9,000
100,000	21,620	17,500	9,800

Auto is figured at 6¢ per mile, rail at 5¢. Pacer rate includes all fixed costs as well as maintenance and fuel. At 50,000 miles annually, the cost per passenger-mile by Pacer is only 1.6¢ total!

TABLE III. COMPARATIVE HOURS OF TRAVELTIME

ANNUAL MILEAGE	AUTOMOBILE @ 40 mph (avg.)	RAIL @ 50 mph	PACER @ 125 mph
20,000	500	400	160
30,000	750	600	240
40,000	1,000	800	320
50,000	1,250	1,000	400
60,000	1,500	1,200	480
70,000	1,750	1,400	560
80,000	2,000	1,600	640
90,000	2,250	1,800	720
100,000	2,500	2,000	800

Look at it either way. You spend lots less time travelling by Pacer, or you can make more necessary trips in the same amount of time. By Pacer it's nothing to fly as much as 500 miles to make a call and return the same day.

PIPER

AIRCRAFT CORPORATION — LOCK HAVEN, PENNSYLVANIA

Airborne Genius

(*Continued from page 19*)

tem ties in his automatic pilot with the "giant slide." We approached Kansas City at about 11,000 feet in darkness above the clouds. With no human aid, the unseen robot sent us gliding down through the soup and placed us squarely over the end of the runway, 10 feet above the ground. Left to itself, the autopilot would have even landed us, perhaps a little bumpily, but Lear took over and set her down.

Such performance makes it easy to understand the enthusiasm of jet test pilots for Lear's latest invention. The jet is a hard plane to fly. It wobbles a lot, and its speed is so great that if the pilot makes a slight error, he is in the next county before he can correct his mistake. He has his hands full flying the plane, and in addition he has to consult navigation charts, operate a radio and watch for enemy planes. It has been extremely difficult to land a jet manually under zero-zero conditions, but test pilots found that when jets were equipped with Lear's robots, hooked up with the landing device, 97 out of 100 landings were successful on the first try. This means, among other things, that more tired or wounded pilots will get home safely.

It is not surprising that Lear's invention has been described by the USAF's General Sory Smith as "the core of the air defense of America." The Air Force has ordered 1800 F-5's from Lear, Inc., and they are being installed in jet planes as fast as they can be produced.

The invention of the autopilot is a natural development in the life of Bill Lear, a ruddy-faced, stocky six-footer of 48 years. He began his impetuous, inventive career on April 14, 1912, the day the *Titanic* went down. As a boy of 10 in South Chicago, he had a telegraph ticker in his room, and was learning Morse code with the boy next door. After receiving a message, he would open the window and yell across, "What did you say?" When he heard that "wireless" messages had been received from the sinking vessel, he could hardly believe it, but was confident that if a device existed for sending messages through the air, he could build one. He went to the library and devoured the little he could find about radio—no one knew much about it at that time. Then he met a boy who had a wonderful basement full of salvaged electrical equipment.

Out of scraps and hunches, Lear built his first radio set. There were no tubes in those days, and as a detector, Lear had a gadget containing metal filings which were designed to catch a broadcast signal by sticking together to close the circuit. The filings had to be tapped loose to get the next signal. To Lear's amazement, the set worked. His friends built sets, and soon they were filling the air with radio messages.

Bill's schooling was sketchy. After six weeks of high school, he had to quit and go to work. He was a garage "grease monkey," he worked in radio shops, and he took a mechanic's job at a Chicago airport because flying fascinated him. He talked by the hour with mechanics, electricians and pilots, thirstily sopping up all the information he could get.

Lear was 15 but big for his age when the first World War came along, and with brash assurance he enlisted in the Navy and became a radio instructor at Great Lakes Naval Training Station. Another instructor was Arthur Godfrey, and they have been pals ever since, as anyone who listens to Godfrey's broadcasts might surmise.

When the war was over, Lear and a partner launched a radio manufacturing shop, laboriously turning out one-tube sets. The sets were good, says Lear, but they didn't know how to sell them, so they lost their small savings. Then he and another boy decided to build an airplane. They reconditioned an old engine and built a small biplane out of wood and canvas. The plane got off the ground, but that's about all that could be said for it.

Lear decided that if he was ever to get anywhere he would need more schooling. By this time he was over 20, was married, had a daughter and was broke. He opened a radio repair shop on credit, where he could work nights to support his family, and enrolled in a Tulsa high school, signing up for a staggering schedule of courses in science and mechanics. With a photographic memory and little need for sleep, he managed to jam four years' school into one, much to the relief of his teachers, for he was always arguing with them and finding mistakes in textbooks.

Armed with his capsule education, Lear plunged into radio again, bristling with new ideas and scorning authority. But he couldn't make money, and drifted from one poorly-paid job to another. Finally in the late 20's, he had a hunch that clicked. It came about because Lear led then as he does today a life of breathless haste, and is impatient a any delay. While driving a car, he hated t wait for traffic lights, and he thought if h could listen to radio music while driving, i would calm his nerves. Everyone else wa saying that radios in cars would confus drivers; also, radios were too bulky to fit i instrument panels.

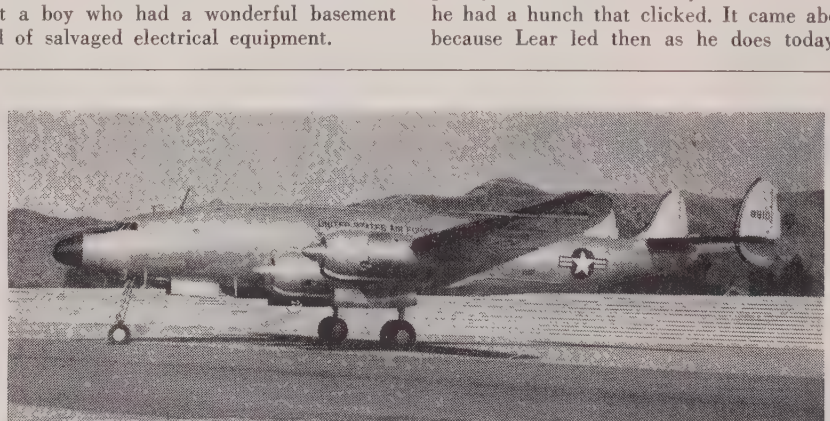
Lear looked over a receiving set to fin out how it could be "sweated down." I those days, a receiving set coil, with it metal jacket, was about the size of a bakin powder can. Three coils were needed, an that largely determined the size of the se The standard radio textbooks of the da said they couldn't be made smaller. "Wh not?" Lear asked himself, and proceeded t design a smaller coil. But he ran into snag He couldn't find wire fine enough for hi midget coils, so he would have to make i himself. And, as usual, he was broke. H took his big idea to a wealthy retired bus nessman for whom he had built several radi sets. Chiefly because of Lear's enthusiasm the man financed his venture. The smalle coil found a ready market and made pos sible one of the first small radios whic soon appeared in millions of cars.

Lear was now making money, but decide that he was in a rut. He likes to quote th old saw, "The only difference between rut and a grave is its length." By now h had begun to fly, and he saw the need fo better aircraft radios and navigational aid So he hired six Chicago radio mechanic invaded New York, and turned a Chambe Street loft into a small factory. But his tin ing was bad. It was in 1934 and peopl weren't buying new gadgets. He couldn pay his rent. He couldn't meet his payrol He couldn't sleep nights. As he paced th floor thinking, an idea struck him.

"At that time," he told me, "every radi set presented a new problem. There was n standardization. I asked myself, 'Why n make a standard radio frequency tune adaptable to all chassis—then the guts the unit will never change?" He spent th rest of the night sketching out his devic and the next day described it to a frien who arranged for him to outline his plan a top executive of RCA. The executive wa interested and let him have a receiver an spare parts to work with. For two week Lear and his gang worked day and nigh building the new unit. RCA bought the i vention for more than 30 times what h would have accepted. Lear's simplified stan ard tuning device, known as the Turr Tuner, has since appeared in millions radio and television sets.

Safe at last from financial worries, Le continued to pull electronic rabbits out hats. He now has 93 patents to his nam and more ideas are on the way. Most of h inventions have been aircraft radio and na igation devices that are smaller, lighter, le expensive and easier for pilots to use th their predecessors. One example is an aut matic radio direction finder (ADF) whi has been widely adopted by owners of priva planes. Another is the "Learnatic Na gator," which hooks up the direction find with a magnetic compass in such a w that it tells the pilot where he is headed b fore he starts to worry about it. For this i vention he received the Frank M. Haw Memorial Award in 1940.

(*Continued on page 59*)



AIR FORCE TRANSPORT is the Lockheed *Constellation*, designated VC-121. It is powered by four Wright engines and carries a crew of six in its "front office." As a military transport it carries from 51 to 77 passengers at 300-mph speeds

MAKING NEWS...MAKING HISTORY!

C-119's SUPPLY TRAPPED FORCES WITH 113 TONS

Drop Accomplished On Half "Football Field" at 800 Feet

HQS, FEAF COMBAT CARGO COMMAND, AIRLIFT BASE, JAPAN—(A.T.)—Again exercising the flexibility of airlift operations, eighteen C-119 Flying Boxcars of the 314th Combat Cargo Wing roared out from this base yesterday with 113 tons of critically needed war materials for embattled United Nations forces in the Chosin Reservoir area.

Immediately after the emergency request for these supplies was received, loading crews began lashing the mixed cargo of gasoline, rations, ammunition and other materials to pallets and loading them aboard the huge cargo carriers. Each aircraft departed for the drop zone as soon as it was loaded.

Seven of the Flying Boxcars reached the drop zone befo[re]

ENGINE AND AIRPLANE CORPORATION

FAIRCHILD

Aircraft Division

HAGERSTOWN, MARYLAND

Fairchild Engine, Guided Missiles, and Stratos Divisions, Farmingdale, N. Y.

One Thousand, Two . . .

(Continued from page 15)

altitude of 1200 feet, the pilot leveled off, and the jumpmaster gave the command to unfasten our seat belts. He walked down between the row of canvas seats, giving each man a piece of wire about four inches long. This was to fasten the static-line securely to the anchor-line cable. I wanted both my hands free for the hook-up, so I put my piece of wire in my mouth.

It was a relief to know that the drop zone was only a 10-minute ride.

The jumpmaster, crouching near the door, peered down at the ground and I knew right then we were almost there. My skin tingled as he stood up and shouted the first jump command, "Get Ready!"

I passed my left hand under the static-line and grasped it at the base of the fastener, bringing it about an inch from my face, with my arm horizontal. At the same time I brought my right foot back against the seat, placed my right hand on my right knee and leaned slightly forward. I struggled to my feet as I heard the command to stand up. Then came the pivot to the right—the shuffling up as close as possible to the man in front of me. I grasped the anchor-line cable with my right hand and held the static-line hook about an inch from the cable between my face and right hand. Remembering the danger of severe injury if the static-line slipped under my arm, I continued to keep my left arm in an horizontal position.

At the command, "Hook-up," I pulled the hook down hard on the cable and locked it. Then I took the piece of wire from my mouth, inserted it in the holes in the hook and bent it over, cursing my shaking hands because they fumbled in this simple operation. I then dropped my right hand to my side and slid my left hand down the fastener to the webbing of the static-line.

At the command, "Check your equipment," I carefully went over my helmet straps, leg straps, quick-release mechanism, shoulder straps, static-line hook, and reserve chute. Then I checked the back pack of the man in front of me and slapped him on the thigh when I saw that it was all right.

The checking was barely completed when I heard the command, "Sound off for equipment check!" The last man hollered, "Eight Okay!" and slapped the man in front of him on the thigh as hard as he could. This we were told to do because the jolt helps to bring a man back to his senses. The next man shouted, "Seven Okay!"

When number one sounded off, he stamped his leading foot (the right one when going out the left door), and shuffled up until his foot touched that of the jumpmaster. He kept his left arm horizontal as his right hand reached for the door and he looked straight to the rear of the plane. Everyone else closed up as tightly as possible.

Because of the number of men in front of me, I couldn't see the first man, nor the door. Only by watching his static-line could I tell when he had jumped. Then suddenly it came . . . I saw his static-line lurch to the end of the anchor-line cable and the men in front of me shuffled forward. There was no stopping now. Even if I did hesitate at the door, the men behind would push me out. Everyone was pushing as hard as he could so I continued shuffling forward, always keeping my right foot ahead of my left, reaching for the door with my right hand and looking to the rear of the plane, not daring to look forward or toward the ground.

Before I even had much of a chance to think about it, I was at the door. I took the final short shuffle with my right foot, pivoted, and placed my left foot on the edge of the doorway. My arms were extended, hands outside the door, knees slightly bent, and upper part of my body erect. I didn't take my eyes off the horizon.

The jumpmaster said, "Go!" and tapped me behind the knee. By this time my mind was no longer functioning and I leaped through the door from force of habit, just as I had done so many times before in training. I brought my feet and knees together, held my elbows to my side, slapped my hands across my reserve chute, tucked my chin into my chest and started counting.

"One thousand . . . two thousand . . . three thousand . . ."

After leaving the plane, the first thing I was conscious of was the deafening roar of the motors and the force of the propeller blast as it spun me around. Then I felt myself falling and the rubber bands snapping as they released the remainder of the static suspension lines.

As I counted I waited and hoped that the chute would open by the time I reached "three thousand!" If it didn't, would I have presence of mind to pull my reserve chute?

I didn't have time to answer that question for as I started to say "three thousand," the words were jerked out of me. Bless it, the chute had opened!

Now the deafening roar was gone. All I could hear was the distant sound of the disappearing plane and the voice of our instructor on the ground as he gave instructions through a loudspeaker.

There was no longer a sensation of falling. I pulled my risers apart, kicked my legs in front of me and looked up to check my canopy as it floated over in front of me.

Looking around I could see other jumpers off in the distance. Suddenly, I felt wonderful. I had done it! I had made a jump!

Proudly I looked toward the ground . . . and quickly realized the jump wasn't over yet. Twelve-hundred feet was a long way down. But, instead of a sensation of falling it seemed as if the ground were coming up.

We had been told to take the "prepare to land" attitude when we reached tree-top level. But the drop-zone was far away from any trees so I watched the horizon and tried to judge when I was about 50 feet above the ground. I reached well up on my risers, brought my feet and knees together, flexed my knees slightly, pointed my toes downward, and looked at the horizon.

It seemed like an eternity waiting for the landing. And the temptation to look down was almost irresistible. Then I hit . . . it was so fast all I could remember was landing like a ton of bricks. But I wasn't hurt.

Looking around, I saw other men getting out of their chutes, so I got out of mine, put it in my kit bag and ran towards the control tower.

As we boarded the bus going back to camp, I spotted another plane approaching the drop zone. I sighed in relief, knowing we would not feel again as the boys up there at that moment were feeling—not again until tomorrow when we would make our second jump, and every other jump thereafter.

A famous general of the U.S. armed services recently said, "When an airplane is sitting on the ground, it's going to waste."

This applies to commercial air transports as well as to military aircraft. And today, when *all* aircraft are vitally needed to help sustain our fighting forces overseas and our defense drive at home, Douglas is making every effort to keep more airplanes in the air more hours.

Much of this effort consists of manufacturing and delivering spare parts. For, under stepped-up flying hours, aircraft parts need replacement more often. Without them the plane is "going to waste."

Supplying tons of spare parts every month for aircraft in all parts of the world is just one segment of the vast Douglas operation. In addition to the many aircraft models currently coming off the production lines, Douglas engineers and research experts have under development advanced types of aircraft, guided missiles and electronic equipment.

Skilled engineers and technicians find Douglas a good place to work!

Depend on

DOUGLAS

WORLD'S LARGEST BUILDER OF AIRCRAFT FOR 30 YEARS ➤ MILITARY AND COMMERCIAL TRANSPORTS
FIGHTERS ➤ ATTACK PLANES ➤ BOMBERS ➤ GUIDED MISSILES ➤ ELECTRONIC EQUIPMENT ➤ RESEARCH

The Rudder and the Turn

(*Continued from page 23*)

turn to the right, and vice versa. Our aspiring airman can observe this yaw by trying to make a turn using just ailerons.

After our pilot has observed yaw, he may begin to wonder what caused it and, if he listens to the older pilots talking behind the hangar, he will probably hear plenty of explanations. There are various stories in circulation which attempt to explain adverse yaw, but two are especially popular.

The first explanation blames yaw on the fact that the outer wing in a turn moves faster and creates more drag which, so the story goes, holds the wing back. This tale isn't too hard to discredit. It is true that a faster moving airfoil does create more drag, but the outer wing is going faster all the time the plane is turning and not just when it is going into or recovering from a turn. As you know, the only time during a turn when it is necessary to use an appreciable amount of rudder is when the plane is entering or recovering from a turn.

The second and probably more popular explanation of adverse yaw blames it on poorly designed ailerons. As this tale has it, the only purpose of the rudder in turning a plane is to correct for the mistakes the engineers made in designing the ailerons. Now it seems that the aeronautical engineers are like most people in that they don't like to be accused of committing a sin when they feel they are innocent. So it is not surprising to find that they have their own explanation for adverse yaw.

Unfortunately, the engineer's answer is not quite as simple or easy to understand as are the two "answers" given above. The engineer's answer is based on the aerodynamic principle that the lift vector of an airfoil is perpendicular to the remote velocity vector. Stated in less confusing terms, it would be that the lift force on an airfoil is perpendicular to the relative wind to the airfoil. Perhaps it will be clearer if we use a diagram to illustrate. *Diagram A* (*page 22*) represents an airfoil section of a wing in level flight. The line marked "V" represents the direction of the relative wind to the wing. The wing in level flight is neither losing nor gaining altitude, so the wind or air is moving straight toward it. The line marked "L" represents the lift of the wing and is perpendicular to the line ("V") representing the relative wind. The line marked "D" represents the parasitic drag of the airfoil and is always paralled to the "V" line.

The principle stated above, that the lift is perpendicular to the relative wind, is true for an airfoil in *all* its normal flight positions whether climbing, gliding, or flying level. The angle of attack of the airfoil has nothing to do with this problem, and need not be considered. The parasitic drag of the airfoil (indicated by the line "D" in our diagram) need not be considered further, since this drag will be equal or so close to equal in both the left and right wings that it may be ignored. I repeat, the main point is that the *direction of the lift on a wing is perpendicular to the direction of the relative wind to the airfoil of the wing.*

To go further into the problem of adverse yaw, let's consider just what is happening to the airfoil section as the wing drops or rises when going into a turn. W will first consider the inside (dropping wing. As the wing drops downward, the air foil section remains in the same positio relative to the horizon. By that I mean tha if the underside of the airfoil section i parallel to the horizon in level flight, it wil remain so as the wing drops. A single ri from the wing of a light plane gives a goo picture of what is meant by the airfoil sec tion of the wing. But the airfoil does no remain in the same position to the relativ wind. That is, as the airfoil moves forward through the air it also moves downward. Thi fact is illustrated by *Diagram B*. Here we se the airfoil in its same position relative t the horizon but not to the relative wind. Th line "V", indicating the direction of th relative wind to the airfoil, shows the air foil's movement through the air as being forward and downward. As the airfoil move in this direction, the air is moving toward it in the direction indicated by this "V" line. Since the position of this line ha changed, the position of the line represent ing lift must change to remain perpendicular

Before explaining what this change in th direction of the lift means, let's examin what is happening to the outside or rising wing in the turn. This airfoil section als keeps its same position relative to the hori zon while changing its position with th relative wind. While it moves forward through the air, it also moves upward. From *Diagram C* we can see the change in th position of the airfoil section to the relativ wind as the wing moves forward and up ward. Here also the position of the lin representing lift must change so that it re mains perpendicular to the "V" line.

Now just what does this all mean? Well here it is. Let's again examine *Diagram* representing the inside wing. Notice tha the position of the airfoil is the same as i level flight, but that the lift force is no sloping forward. The forward slope mean that part of the lift force is pulling straigh upward and part of it is pulling forward o the wing. This is indicated by the dotte lines in the diagram. Now let's look at th *Diagram C* and observe what happens to th outside wing. Here the line indicating li is sloping toward the rear of the airfoil se tion. This indicates that part of the lift forc is pulling straight upward on the wing an part is pulling backward. Again these force are indicated by dotted lines.

Let's see how these horizontal forwar and backward forces effect the plane as is being banked for a turn to the left. I *Diagram C*, the dropping wing—in this cas the left one—has a force pulling forward a well as upward on it; and the right or ou side wing has a force pulling backward an upward on it. So, as the plane banks to th left, the left wing tends to be pulled forwar and the right tends to be pulled to the rea by these horizontal forces, and as a resu the plane tends to turn (yaw) to the right.

Actually that's all there is to the areonau ical engineer's aerodynamic explanation adverse yaw. Therefore, if you should ha pen to be at the local airport with yo girl, and she should happen to ask the pu pose of that flipper sticking up at the bac end of the plane, you will know just wh to tell her. Look her straight in the eye an explain it . . . . . unless, of course, you wa to use the time for more interesting activ ties, and you disagree anyway.

★ CLASSIFIED ADVERTISING ★

SKYWAYS' CLASSIFIED ADVERTISING RATES ARE 15¢ PER WORD—FIRST 15 WORDS (MINIMUM SIZE) $2.00

AIRCRAFT WANTED

POWERS & GEORGE, Aircraft Brokers, of 475 Fifth Avenue, New York City, have purchasers for all types of aircraft. No charge for listing your ship for sale. Write for details, describing your airplane. "Airplanes Everywhere."

CESSNA—140, Good Condition, low time, Must have lights and radio. Will Pay $1,000 cash. Flying Amvets Post #1, c/o L. W. Harms, 13830 W. Capitol Drive, Milwaukee 10, Wisconsin.

USED PLANES FOR SALE

BEECHCRAFT

BONANZAS: 14 from $6500. 1948, A-35, #698BS, has 225 hours. Gyros. Omni-range. Loop. Hangared. Undamaged. Bargain. $10,000. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

D-18-S TWINS: 4 available. 1946, #84089S, has seven seats. Lavatory. Majored engines and propellers. Collins VHF. ADF. Beautiful new appearance. Relicensed. $43,100. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

BELLANCA

CRUISAIRS: 16 from $2800. December 1948, #78447S, has 170 hours. Station Wagon. Mahogany interior. White leather seats. Aeromatic. Primary blind. Radio. Hangared. Special finish. Beautiful. $4725. Also; new 1950, #4820NS, with 23 hours. Narco omnirange. Extras. Bargain. $7000. Consult, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

CRUISEMASTERS: 2 from $7600. October 1950, #6994NS, has only 25 hours. Deluxe airplane. Bargain. $9600. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

CESSNA

140'S: 21 available. All metal, #9255AS, has 265 hours, engine 35 since overhaul. Metal propeller. Primary blind. Radio. $3250. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

CESSNA 120, 1947, basic blind group, navigation and landing lights, electric starter, generator, Halicrafter MHF, Narco VHF, 1,500 hours total, just majored, new fabric on wings, $1,285. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

ERCOUPE

ERCOUPES: 13 available. October 1949. #98815S, is painted blue. 141 hours total. Metal propeller. Primary blind. Radio. One owner. Undamaged. Hangared New condition. $2475. Consult, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

GRUMMAN

GOOSE AMPHIBIANS: 4 ships available. For complete details, price, and locations, consult, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

MALLARDS: November 1946, #2349S, has 1070 hours, engines 300 since majored. Beautiful ship. Corporation-owned. Best Collins, ARC, and Bendix radio. Oxygen. Exceptional maintenance. Try offer $122,000. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

ALL CLASSIFIED ADVERTISING accepted with the understanding that it will be placed in the first issue closing after receipt of order. Classified forms close first of second month preceding date of issue.

All Classified Advertising Prepaid

HOWARD

HOWARD 1943, civilian model, Wasp Jr. engine, 500 hours total, 350 on engine, 150 since top basic blind, artificial horizon, directional gyro, lights, 2-way radio, Ryan VHF, Bendix ADF, just repainted and reupholstered, fabric excellent, $3,990. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

LUSCOMBE

90HP 8F'S: 7 from $1800. Three new 1950 ships with 10 hours. Metal propellers. New guarantee. $3125. Factory price $3770. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

NAVION

NAVIONS: 39 from $4125. Late 1949, 205HP, #4546KS, has 310 hours. Overhauled latest metal propeller with spinner. Standard instruments and radio. Immaculate condition. $7750. Consult, POWERS & GEORGE. Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

PIPER

FOUR PLACE FAMILY CRUISER and 31 ft. tandem house trailer—Trade for Stinson station wagon—The Calack Co., 802 2nd St., Canton, Ohio.

PIPER CLIPPER, manufactured 1949, 2-way radio, 700 hours total 150 since major, new propeller, fabric excellent, $2,350. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

STINSON

165'S: 21 from $2350. 1948, #6905MS, has 366 hours cross-country. Metal propeller. Extra instruments. Loop. One owner. Hangared. All bulletins. Immaculate. $3000. Make offer. Apply, POWERS & GEORGE. Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

STINSON 108-3 Manufactured 1948, basic blind, navigation and landing lights, electric starter, 2-way radio, 1,300 hrs. total, 350 since major. $2,990. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

STINSON 10A VOYAGER. 90 H.p. Franklin—575 hrs. total—375 hours since major, original owner. Personal transportation only. Excellent condition but requires recovering. Extra wing tank, 6 hrs. flying range. RCA transmitter, receiver. Standard instruments plus Kollsman direction indicator, turn and bank and 8 day clock. This ship is not 105. Has excellent take-off performance and is very smooth. Price $650.00. C. S. Robinson, Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, New Jersey.

SWIFT

125'S: 14 from $1780. 1948 Temco, #3283KS, has only 172 hours. Aeromatic. Primary blind. Radio. $2890. Make offer. Also; several new 1950 Swifts. Test time only. Available $3950. List price $4495. Factory extras available .Inquire, POWERS & GEORGE. Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

TAYLORCRAFT

LATE TAYLORCRAFT, Private owned, low time, always hangared, radio, like new. Norman Drew, Greenville, Ohio, R. 4.

MISCELLANEOUS

FOR SALE AND ALSO WANTED—Used Aircraft; free listing. Lenard Aircraft, 505 Fifth Avenue, New York.

IN THE MARKET FOR A SMALL USED AIRPLANE? Write for information about our exceptional values. Airmart Aircraft, 1930 S. State St., Chicago, Illinois.

AVIATION EQUIPMENT & SUPPLIES

GENUINE Navy intermediate flight jacket, new, dark brown goatskin leather. Bi-swing back, two patch pockets, one inside snap pocket. Completely lined finest rayon. 100% wool knit cuff and waist. Zippered front. Sizes 34-46 only $32.50. Write for (Free Catalogue). We pay postage if payment accompanies order. C.O.D.'s upon request. No C.O.D.'s overseas. R.A.F. Mfg. Co., 7009 N. Glenwood Ave., Dept. SK-5, Chicago, Ill.

E-6B COMPUTERS $5.25 with leather cases. Pioneer-Bendix magnetic Compasses, type B-16 with night light. Fits 3¼ inch opening $5.65. B-5 Driftmeters $12.85. Bausch & Lomb Sextants type A-8A $12.85. Above items like new. Money back guarantee. Kane Aero Equipment Co., 2308 N. E. 23rd St., Oklahoma City, Oklahoma.

GEAR POSITION INDICATOR Nonelectric shows each gear movement. Can't get out of order or adjustment. Chromplated last life of ship. Adds Safety & Pleasure. We guarantee you will be tickled or money refunded. Child can install in 2 minutes. Kit $5.00 Postpaid or C.O.D. AirEco, Box 6284, Jacksonville, Florida.

PATCHES, Military or Civilian stamped with gold, silver or burned. Wings and name $1.00 each, 3 for $2.00. Names only 2 for $1.00. JULIE'S LEATHERCRAFT, Lone Tree, Iowa.

CHUKKA BOOTS, new, fully leather lined, $16.95. Postpaid from Chippewa Falls, guaranteed, send size, width, money-order to Tom Carney, 3731 W. Center, Milwaukee 10, Wisconsin.

YOUR LEATHER JACKET RENOVATED EXPERTLY. FREE circular. Berlew Mfg. Co., Dept. 33, Freeport, N. Y.

BOOKS

FLYING THE OMNIRANGE by Charles A. Zweng New "first edition" fully illustrated, designed to aid the pilot in flying the new Omnirange Stations now being established by the C.A.A. Order now C.O.D. or postpaid. Deluxe edition only $4.00. Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

DRAFTEES: Prepare quickly for Aviation Cadet and Officer Candidate qualifying examinations. Practice Tests with home-study instructions. Each $3.25. Both $5.00 Prepaid. Cramwell Books, Air Institute, Adams, Mass.

ENGINEERING DATA Interested in aircraft machine, materials, engineering methods and design formulas. A list of over 293 free valuable books and engineering data manuals is now available. Send $1.00 to Antoc Box (316) G.P.O. 1, N. Y. C.

BULLET RACEPLANE—Homebuilt, fast, light economical monoplane. Complete blueprints $2.00. Corbcraft, 81 Elmerston, Rochester 20, New York.

BOOKS (continued)

ATION QUIZ BOOKS—The following outnding books by Charles A. Zweng lead field and prepare you for your rating. luded with each book are authentic exinations with new material not available ewhere. Also included is a late Governnt Weather Map pertinent to the examiion. Why take a chance? Zweng Books lude: Flight Instructor $3.50; Flight gineer $4.00; Link Instructor $4.00; Prie & Commercial Rating $3.50; Instrunt Ratings $4.00; Airline Transport Pilot tings $4.00; Meteorology for Airmen 00; Aircraft & Engine Mechanic includ- hydraulics, weight and balance $3.00; rachute Technician Rating $3.00; Flight spatcher $4.00; Civil Air Regulations 00; Private Pilot Rating $1.00; Airport eration and Management $4.50; Zweng iation Dictionary $6.00; Aeronautical vigation $3.00; Practical Manual of the B computer $2.50; Ground Instructor ting $3.00; Flight Instructor Oral Exination $1.00; Control Tower Operator, Flight Dispatcher covers most of the ntrol tower examinations, $4.00; Leading rline Executive and Pilots owe their sucs to early training with Zweng Texts. n-American Navigation Service, 12021-22 ntura Blvd., N. Hollywood, Calif. (Free talog.)

ARANTEED: Ross Guaranteed Questionres are available for all C.A.A. ratings. ey carry a full money back guarantee if u fail to pass your exams. Ross Questionres have been used by thousands of ots, Mechanics and Instructors with sucs. The frequent revisions insure your obning the very latest material. With a ss Guaranteed Questionnaire you save ne, Effort, and Money. Order direct or m your nearest Dealer. Engine Mechanic 00; Aircraft Mechanic $3.00; Both for 00; Commercial Pilot $4.00; Flight Inuctor $4.00 Instrument Rating $4.00; teorology Instructor $2.50; Navigation structor $2.50; Aircraft Instructor $2.50; gine Instructor $2.50; C.A.R. Instructor 50; Fundamentals of Instruction $1.00. a special offer the complete set of the ve Questionnaires are priced at only .00. Ross Guaranteed Questionnaires are only books available that include the ic Navigation and/or Weather maps that e used by C.A.A. on their exams. Free der on request. Orders sent Postpaid or .D. Ross Aero Publishers, Dept. 1-s, ministration Bldg., Commercial Airport, lsa, Oklahoma.

DENTS, MECHANICS, FLIGHT ENGINEERS: ro Mechanics Questionnaire" by Ralph . A greatly enlarged and completely reed printed edition, 222 pages of multiplece questions, answers, and explanatory es covering all phases of Aircraft and gine Mechanics including Power Plants, buretion, Lubrication, Propellers. Elecity, Woodwork. Dope and Fabric, Sheet tal, Welding, Rigging. Weight and Bale problems. Hydraulics and Civil Air gulations based on current issues. $5.00 tpaid, or c.o.d. plus postage. Address: xon Publications, Box 479, Lawrence, nsas.

BUSINESS OPPORTUNITIES

J MAY NEED THIS INFORMATION. "Survey Aviation Employment." Send $1.00 now latest job news. AIRPLANE DESIGN RP., P. O. BOX 972, SEATTLE 11, ASHINGTON.

ULD YOU pay 3%—first $350 made? Book 5 Odd Successful Businesses," free! Ext something odd! Pacific-36, Oceanside, ifornia.

E Report. 47 ways to start your own aviaon business with $100 to $1,000 capital. x 111-DP6, Holtsville, N. Y.

HELP WANTED

ASKA—America's Frontier. $1.00 brings 1 Business Directory, Large Government p giving Up-To-Date CONSTRUCTION OJECTS, Current employment informans, Homestead & Highway facts, Hunt-Fishing-Game Rules, Firms hiring & blication forms. Alaska Opportunist, P. Box 883-SS, Hollywood 28, Calif.

HELP WANTED (continued)

FOREIGN & LATIN AMERICAN EMPLOYMENT. 1951 "Foreign Service Directory" gives Up-To-Minute Facts on Military & Civilian Construction, Government Jobs, Major Oil listings. Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters, How-When-Where to apply, application forms, Hot List Firms Hiring. $1.00 postpaid. Global Reports, P. O. Box 883-SS, Hollywood 28, Calif.

PILOTS: We can help you find the job you want! No registration fee. Send for application blank. PILOTS EMPLOYMENT AGENCY, Box 152S6 Whippany, New Jersey.

INSTRUCTION

NAVIGATOR Rating Examinations included in New Aeronautical Navigation by Charles A. Zweng $3.00; Fairchild Surplus (Electrical Averager) Sextant $17.50. PILOTS supplement your training. Order "Ground Instructor" $3.00 and "Ground Instructors' Rating" $3.00; Examinations included. These books by "Zweng" prepare you for increased earning power. Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

YOU CAN DESIGN AIRPLANES For Pleasure And Employment. First Ten Basic Lessons In Airplane Design Home Study Course Tell How. Send Only $5.00 and Receive Aviation Job Survey FREE. AIRPLANE DESIGN CORP., P. O. BOX 972, SEATTLE 11, WASHINGTON.

INSTRUMENTS

NAVIGATION INSTRUMENTS: Beautiful new and reconditioned precision instruments. Brand new Link Aircraft Sextants with case $37.50; Fairchild averaging type $17.50; Bausch & Lomb Sextants, excellent condition, $49.75; Hamilton 24 hour Master Navigation Watches $65.00; Pioneer Panel Compass (new) $17.50; Dalton Model "G" Computer (new) $7.50; Weems Mark II Plotter $2.00; Dalton E-6B Computer $10.00; A-2 Deluxe Computer with case $3.00; American Airlines Computer $5.00; Model "D" high speed $6.00; Astro Compasses (new) $12.50. (Free Catalog.) Pan American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

WEATHER INSTRUMENTS. Beautiful Taylor Barometer, brass finish $18.00 and up; Temperature and Humidity Guide $7.50; Dr. Krick's handsome weather forecaster with compass, satin metal finish only $12.50; Beautiful imported drawing instruments in German silver eight piece sets, plush case only $5.50. Airport set comprising Wind Vane, Anemometer, Indicators, etc. $150.00. Barometer for your office only $9.00. Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

POSITIONS WANTED

COMMERCIAL pilot with multi-engine rating, will travel, salary secondary. Box 17, New York, New York.

MISCELLANEOUS

LEARN MICROPHONE ETIQUETTE with attractive decal for instrument panel, showing code, phonetic alphabet, and plane's number. Two for $1.00, includes calling procedure Digest. No C.O.D. Safetycals, 25 Woodridge, Muncie, Indiana.

GET IN ON THE FUN for "Kids" from 8 to 80. Play "AIR DERBY" the exciting New Aviation Game. "AIR DERBY" is the new cross-country board game which depicts actual flight experiences in modern, authentic aviation terminology. Fuel stops, weather and other pertinent C-country experiences are typically portrayed by the moves. It's Entertaining! It's Educational! Price $1.00 cash or C.O.D. plus postage and charges. Order from AIR-O GAMES, Dept. 3512, 112 E. Grove St., Bloomington, Illinois.

Airborne Genius

(Continued from page 52)

World War II put Bill Lear into big business, for he had prepared himself to turn out midget devices in the great quantities needed for fighting planes. By the time the war ended, he had filled government orders totaling $100,000,000, and with his expanded production facilities, he looked around for new worlds to conquer. He designed a remote control system for guiding new planes from the ground on their test flights, so that pilots need not risk their lives testing new experimental planes, and he has turned out a top-secret electronic system for the accurate control of guided missiles. He has also designed an uncanny talking machine for department store counters which electrically detects the presence of a shopper and quietly describes the goods on display—an invention temporarily shelved because of government orders.

Bill Lear nursed his new autopilot all the way from the laboratory through test flights. He had already turned out an excellent lightweight model (L-2) when the Air Force decided to concentrate on jet fighters, so he had to go back to the shop and build a newer one which would react fast enough to match the phenomenal jet speeds. The heart of his F-5 is the new "magnetic clutch," by which a small trickle of electric power is instantly amplified to govern the controls of the speeding fighter. After finishing the mighty midget, Lear spent 3600 hours in the air with it, flying all manner of planes day and night in all kinds of weather. Now he is satisfied that it can fly everything from a light civilian plane to a giant B-36 bomber.

While testing the F-5, Lear confused many airport officials, particularly when landing during soupy weather. At Los Angeles Airport, he radioed through an impenetrable fog to the man in the control tower. Startled, because he couldn't even see Lear's plane, the control man shouted: "You can't land now!"

"I already have," Lear answered calmly. "Right in front of your tower."

With defense orders totaling $30,000,000 and plants at Grand Rapids, Elyria, Ohio, and Los Angeles employing a total of 2,000 people, Bill Lear finds plenty of outlets for his restless, driving energy. He virtually lives in the air, burning up the skies at the rate of 18,000 miles a month, visiting his plants, attending conferences in Washington and New York, and dropping in at way stations as the spirit moves him.

At 48, Bill Lear is a multimillionaire and sitting on top of the world. As a hobby, he has been searching for the fabled Lost Dutchman gold mine in southern Arizona, and has bought a tract of land in the Superstition Mountains where he hopes to rediscover the old bonanza. Although many prospectors have died searching for the Lost Dutchman, Lear has already stumbled on a silver vein which looks promising and has also unearthed a deposit of tungsten-bearing scheelite—a mineral of vital strategic value.

But his real bonanza is the inventive imagination which has brought him from rags to riches in 16 years and has put his grinning face in bales of newspaper clippings. He enjoys the recognition, but quotes the remark of an old friend: "Publicity is all right if you don't inhale it."

Dilbert

(*Continued from page 43*)

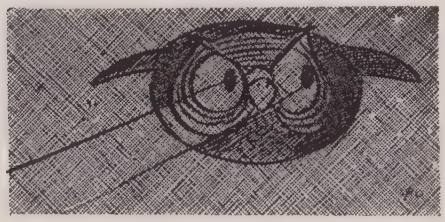
comes within range, one of them is bound to announce in a hoarse, stage whisper, "I'd have made it, too, but some b—— swiped my flying suit!"

Ten Commandments for night Vision

You used to hear a lot about eating carrots to enable you to see at night like a cat. Personally, I don't think vitamins or carrots do much to improve your natural ability to see at night.

The main trouble with our eyes is that they are poorly designed for night vision; they are not sensitive enough to dim light. Roughly, your eyes can determine detail five times better in daylight than in the brightest moonlight. The average airplane is not visible to most people from ahead or astern farther than 1,000 feet away, on a clear starry night.

So we don't see very well at night. And yet, we fly then. It behooves us, therefore, to get the very most out of our sight equipment—and there are certain things we can do to insure just that:



1. Do not attempt night flight until dark adapted. You can do this by staying in a dark room for a half hour before take-off. An easier way, however, is to wear a pair of tight-fitting dark adapter goggles for 30 minutes prior to take-off. They have red lenses and enable you to remain in a brightly lighted room during this period. Remember, however, that you cannot determine red lines on charts or maps while wearing red goggles.

2. Maintain maximum dark adaptation by avoiding all possible light. One streak of light and you have to start over.

3. Use a dim light, preferably red, for instrument lighting. Do not stare longer than necessary at lighted instruments. The best way to do this is to be able to recognize all your surroundings by touch—the old blindfold drills.

4. Keep your windshield and goggles spotless and unscratched.

5. Practice looking out of the corners of your eyes. Due to the construction of the eye, objects can be picked up and seen better this way than by looking directly at them.

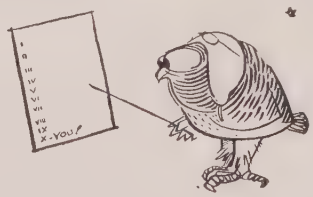
6. Keep your eyes moving. Practice systematic searching, and be alert to detect moving objects.

7. Use night binoculars when available.

8. Be sure and use oxygen, if necessary. And it *will* be above 6,000 feet. Night vision is one of the first faculties to be adversely affected by altitude. To preserve maximum vision and efficiency, flight crews are urged to start using oxygen before reaching altitudes where it is necessary.

9. Be sure you are physically fit; night vision suffers seriously when you are not. Don't break training—the stakes are too high.

That makes only nine commandments. Well, for number 10, suppose you recheck and be sure that you have followed the other nine. Be over-conscientious at night, not over-confident.



Ignominy—Dilbert and his sidekick (also a pilot) were dispatched in a two-place job to help search for a man reported overboard from a coastwise freighter. They located the man shortly after arriving in the area, and dropped him a life raft. After marking the spot with smoke flares, they gave the freighter the old dive-and-zoom business.

While waiting for the freighter to make the pick-up, Dilbert, in the front seat, circled the wet sailor at low altitude to keep him company. Suddenly, Dilbert felt a jerk on the stick, and released the controls, *thinking* the rear seat pilot had taken over. The airplane immediately took matters into its own hands

and flew into the water. The status of our rescue heroes was now humiliatingly reversed. They were picked up by the freighter they had been sent to help.

It is hard to beat this costly accident for pure negligence and carelessness. There is no excuse for ever varying the correct procedure for changing controls; it was evolved specifically to prevent just this dumb sort of thing. Besides having an inter-com phone, Dilbert could have looked directly at his co-pilot with only a slight turn of the head.

P.S. The "jerk on the stick" felt by Dilbert was undoubtedly due to flying through his own slip stream in a tight turn.

P.P.S. Jerk on the stick; jerk on the stick. Whom does this remind you of?

Dilbert Proof—Have you heard about the new parachute produced by the Materiel Command of the U.S. Air Force? It has a built-in brain which makes it practically foolproof. This brain automatically opens the chute, even if an airman is injured or blacks out.

Designed for high-flying aviators, the release of this parachute is tripped by a timer which is set before take-off at a predetermined interval. Even if this timer malfunctions, the chute will open above 5,000 feet. This latter action is achieved by the workings of an aneroid barometer which is installed in each chute.

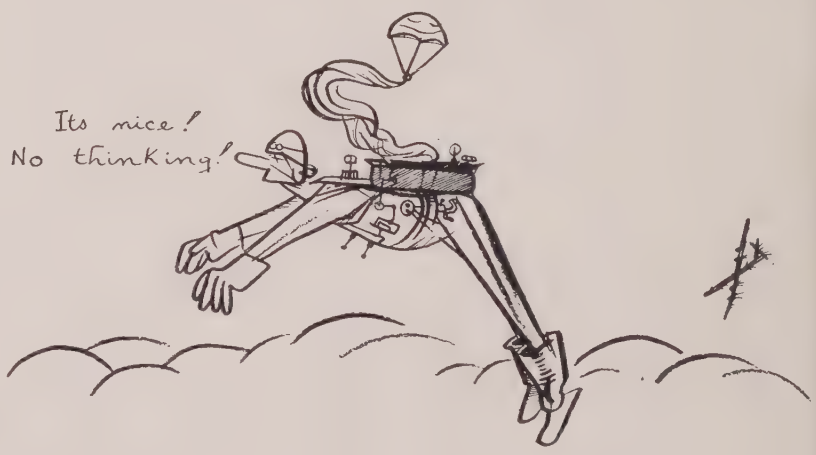


PHOTO CREDITS

Pages 10, 11, 12—Wide World, USAF, North American, Associated Press; 13—Boeing, Allison; 14, 15—Gerald Adams, INS, Sgt. Joseph Wolfe; 16, 17—Neal, Downie; 18, 19—Alanis, Lear; 20, 21—Howard Levy; 25—USAF; 26, 27—Douglas, Boeing, Consolidated, North American; 28, 29— Boeing, Martin, AF, Lockheed, North American; 30, 31—North American, Republic, McDonnell, Northrop, Lockheed; 32, 33—Republic, North American, Lockheed, Fairchild, Boeing; 34, 35—Chase, Douglas, Northrop, North American, Consolidated, Lockheed; 36, 37—Beech, Northrop, Consolidated, Stinson, Cessna, Ryan, Grumman; 38, 39—Bell, Piasecki, Sikorsky, Hiller; 44—J. I. Case; 52—Lockheed

NAVICOM

A-W Div. Tests Microwave System

Air Materiel Command to determine electronic aids for Common System

The important job of determining hich of the electronic aids to air navi- tion now under development are suit- le for consideration in the "Ultimate ogram" of the Common (civil-military) stem is being carried out by the All- eather Flying Division, AMC, Wright- tterson AFB, Dayton. The comman- r is Col. J. Francis Taylor, Jr., who s been unsparing in his efforts to aintain an effective program.

icrowave OBD ▶ One series of proj- ts comprises the USAF-Sperry air-navi- tion system in the 5,000-mc frequency nd, which utilizes microwaves six cen- neters long. The first of these projects s the Microwave Landing System, de- ribed by Sperry engineer Joseph Ly- an in a paper before a sectional meet- g of the Institute of the Aeronautical iences about three years ago.

Following this was the precision omni- ectional radio range (ODR) which rms the basis for a new OBD (omni- aring-distance) system for the critical minal areas, and which uses the same m microwaves. This development was scribed in a joint paper by engineers e Lyman and George Litchford at the nual meeting of the IAS last year e *SKYWAYS,* April 1950, "Microwave ghthouse").

This microwave OBD system has been talled at Wright-Patterson AFB for ght testing by the All-Weather Flying vision, under ANDB's navigation aids luation program. (The Air Naviga- n Development Board has responsi- ity for all research and development ojects for the all-weather common sys- n of air navigation, landing and traf- control.)

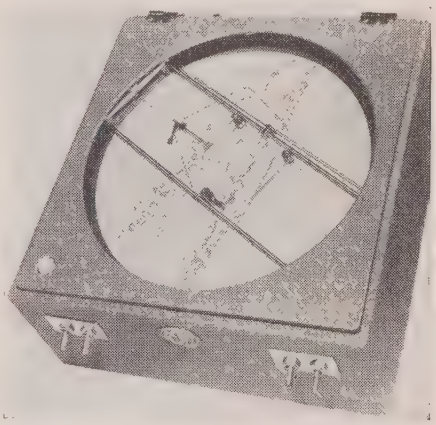
crowave DME ▶ The next stage was development of a new kind of dis- ace measuring equipment, some de- ls of which were described in another man-Litchford paper at this year's S meetings. This microwave DME es the same ground transmitter, air- ft receiver and radio channel as the ecision omni-directional radio range DR), and is based on the *phase* dif- ence between transmitted and re- ved C-W (continuous wave) tone odulation. This is in contrast to the current types of radio systems which measure distance, most of which measure the transit time of radio *pulses* to determine the distance.

To remove ambiguities and to achieve a more accurate distance measurement, a "decade" comprising a "coarse" signal based on 1,000 cycles and a "fine" signal based on 18,600 cycles is used, with a "phase shifter" for measuring the electrical phase difference between two signals of the same frequency.

Automatic Map Plotter ▶ The microwave ODR-DME system, which is now undergoing flight trials at the Air Force AWFD at Dayton, presents its position and guidance information to pilots on an automatic map plotter in the cockpit. Preliminary flight trials of the map indicator operating on the new navigation system were made during October, 1950, in a USAF C-54 at Sperry's flight research center, MacArthur Airport, Islip, Long Island.

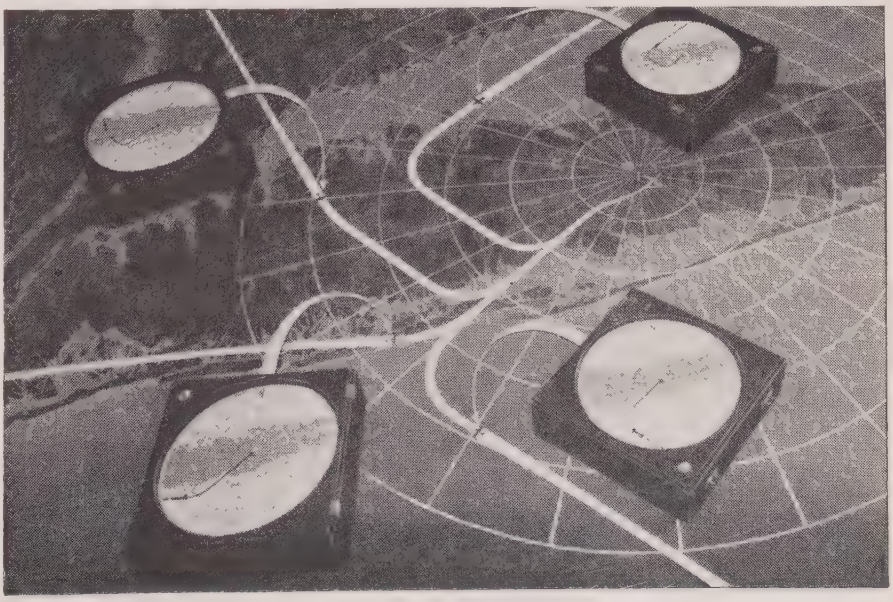
The map indicator in the airplane works as a graphic computer which permits the pilot to fly any required combination of straight and curved flight tracks in the terminal area. The indicator uses a circular map of the 30-mile area printed on facsimile paper. An electrical stylus or "bug" which represents the airplane and its position in the terminal area automatically moves over the map as the airplane maneuvers in space. As the stylus moves, it records the actual path or flight track of the airplane. It was reported to be able to show track deviations as small as a few hundred feet in the 30-mile area.

The ultimate goal of this development is to provide a traffic-control system which not only is adequate for eliminating traffic jams around major air terminals and critical Air Force bases, but is also capable of being expanded to meet future demands of an air transportation industry which is growing faster each year.



MAP INDICATOR gives pilot guidance information in the traffic zone of the airport

DRAWING shows USAF-Sperry navigation system. Pilots get position indications from DME



CAA Communicators Aid Pilots

Flight Assistance Service records 475 "saves" through emergency calls in '50

The Transition Program Aeronautical Communications System includes voice radio circuits for air-to-ground and ground-to-air communications and interphone, and teletype circuits for point-to-point communications. Air-to-ground and ground-to-air circuits are handled through frequency bands ranging from LF to UHF, depending upon the airborne equipment in each particular case. Due to the static interference and poor propagation characteristics of transmissions in the lower portion of the spectrum (LF, L/MF, and HF), there is a healthy trend toward concentrating civil air/ground communications in the VHF band, and military air/ground communications in the UHF band.

Communications may be between the airport traffic-control tower and the aircraft, or between an interstate aeronautical communication station (INSAC) and the aircraft, or directly between the air route traffic-control center and the aircraft, depending on the position of the aircraft and the nature of the intelligence to be exchanged.

According to an analysis of the 1950 reports made by the CAA in Washington, the skill and alertness of CAA radio communicators in reply to 475 emergency calls from pilots averted what might have been 1,560 fatalities and loss of aircraft estimated at approximately $15 million.

Flight Assistance Service ▶ Utilization of CAA's flight assistance service increased approximately 50 per cent over 1949 when some 5,825,000 requests were handled as against over 8,540,000 in 1950. This growing use of radio and of the preflight briefing service available to all pilots at CAA stations accounts in a large part for the reduction of emergencies handled during 1950.

When the service was inaugurated in 1948, the CAA's record showed about 4400 emergency calls for aid had been received. With the increased emphasis on preflight and in-flight service, the emergencies were reduced to 571 in 1949 and 475 in 1950. An assist in the reduction of the heretofore large number of emergency requests should also be credited to the increase in the filing of flight plans, which enables CAA to warn pilots enroute when weather conditions ahead change suddenly.

Most emergency calls in 1950 were from pilots who were lost or caught in bad weather. Pilots get lost for various reasons. Some encounter heavy rain squalls and lose their bearings. Some are blown off course by strong upper winds. Some are lost in smoke haze. Some take off unwisely in, or fly into, weather too tough for them to handle, and others fail as weather prophets and get caught in weather.

FAS at Work ▶ When the lost pilot calls in for assistance, the CAA communicator sets to work demonstrating that it is possible for a man sitting in a little house on the ground 40 or 50 miles away to "fly" an airplane and bring the craft out of an emergency situation to a safe landing.

These INSACs are well scattered throughout the CAA regions, with an average of 62 in Regions 1 to 5, 50 in Region 6 and 43 in Region 7. This makes a total of 405 domestic stations, with 39 more in Alaska and 7 in Hawaii. A large number of the communicators working in these stations are pilots themselves, and all are quite familiar with the appearance of the ground from the air in the areas covered by their stations. This, as many "saves" prove, is of great importance in their work.

Sometimes great ingenuity is necessary to bring about a safe landing. In one case the powerful searchlight of a drive-in movie theater was used to orientate a lost National Guard pilot. In another, the flashing obstruction lights of three radio towers did the trick. Another time a well-known local swimming pool was the clue to a pilot's location. In fact, in orientating these lost pilots CAA communicators used every conceivable type of landmark—highways, railroads, rivers, lakes, mountains, mills, advertising signs, buildings, towns and cities.

As an example of orientation by radio aids, the CAA radio at Sinclair, Wyoming was called upon to assist a pilot who reported that he was not sure of his position except that he was west of Sinclair. He reported receiving a strong "N" from the Sinclair range. By combining this information with the fact that the pilot's contact with the Rock Springs radio was received at Sinclair with a very loud signal, and in view of the pilot's statement that he was west of Sinclair, the pilot was advised that he was in the southwest quadrant of the Sinclair range. It was suggested that he take a magnetic heading of 337° and report upon hearing the on-course signal which would be the west course of the Sinclair range. A few minutes later the pilot reported on the west course. He requested and received clearance to de-

ıd from 14,700 to 10,000 feet and at)00 feet broke out of the clouds over wlins airport, where a safe landing ; made.

R Pilot Aid ▶ CAA finds that too ny pilots seem to feel that Federal s to navigation are only to guide and ıtrol instrument traffic. Actually there a wealth of service available to the ual Flight Rule pilot and it can be d without extensive and expensive borne radio equipment.

t is also true that many VFR pilots o have had little or no experience in io procedures hesitate to use the mi- phone for fear of committing a vio- ion. This is a needless fear. Say it any y you want to, but let them know en you need help. Any CAA station l alert DF stations and obtain a ra- fix for a pilot, help identify land- rks, suggest courses to fly, check ather reports and direct him to the ırest weather-safe field, make emer- ıcy ground arrangements on request, l assist in any way possible in meet- ; an emergency.

AA Advises Pilots to et Omni Equipment; HF to Replace L/MF

n an address at the Spring Meeting the Radio Technical Commission for ronautics, newly appointed CAA Ad- ıistrator Charles F. Horne made an portant statement on the present rlapping of the omni-range program l the old four-course radio range sys- n.

The keystone of the air-navigation em of the ***immediate*** future is the y high frequency omnidirectional ra- range—VOR or omnirange for short. is facility will replace the low and dium frequency four-course radio ge which has been in use for the past years.

The SC-31 report proposed a total of omniranges in the 48 states. We feel t more like 500 will be required. Of 500, we have money for 419; 342 are shed, 26 more are operable, and 51 itional are underway, that is, in va- is stages of survey, construction and l installation.

This omnirange program is thus tty far advanced, so much so, in fact, t we shall soon be forced to discon- ue the L/MF four-course radio ges. It may be considered desirable, course, to keep certain L/MF ranges service until every last airplane is ipped with VHF, but there will come ay, and soon, when we can no longer port before Congress the request for ds to keep our old friends on the air and still continue operation and expansion of our new facilities.

"It behooves everyone, therefore, to get the necessary airborne equipment to 'go VHF' as soon as possible. We shall be shutting down some 50 or more of the old four-course ranges in the next 12 months, so, I suggest, people should get ready. We have already commissioned several large segments of VHF airway in the central states, and more will be ready soon. It probably is in those areas that you may look for early discontinuance of the L/MF four-course ranges. I would like to emphasize, however, that it is only the ***ranges*** which are to be discontinued for the present. The L/MF homing facilities probably will be required for some time.

"As long as a sizeable number of aircraft are still completely dependent upon the L/MF frequency system to navigate from point-to-point and to perform their communications functions, it will not be possible to realize the full advantages of the VHF/UHF system. Hence, after fair warning, there comes a time when we must remove the old system, not only for economic reasons, but because it is essential for the improvement of safe aircraft operations. The installation of airborne equipment is as much a part of the program as the establishment of ground aids.

"It is my firm conviction that equipping aircraft to use the Common System is aviation's big job today. The CAA is working daily with other government agencies, the RTCA, and with all interested elements of the industry, to make our improved all-weather flying system a real benefit to as many users as possible."

UHF for Military

During the meetings of NSRB Task Group "E" on Airways and Air Traffic Control it was discovered that of the three main segments of aviation which use the Federal Airways—military, airlines and company aircraft—the military was far behind the other two groups in the matter of airborne equipment for the Transition Program. Corporation aircraft were the most advanced, with a very high proportion equipped with VHF communication and navigation sets, ILS, Zero Reader, etc.

One reason for lag in the military is that Air Force, Navy and Marine aircraft will require a "tactical" navigation system for extreme emergencies (such as threat of bombing the U.S.) when most of the other aids to air navigation will be turned off. This will be in the UHF band, and plans for it are well advanced. For normal air transport purposes the Armed Services will use the Common System.

X-C Flight Aid Developed by Halpin

Coairdinator provides simple outline of flight procedure for X-C flights

In these days when the filing of flight plans is becoming increasingly essential, anything to simplify the procedure is sure to be welcomed by all pilots.

The Halpin Flight and Route Plan ***Coairdinator*** (copyright title) provides a simple outline of a practical flight procedure for carrying out cross-country flight—either VFR, IFR or the newly required DVFR (Defense Visual Flight Rules) in certain ADIZ (Air Defense Identification Zones).

X-C Pre-planning ▶ In any X-country flight, good pilotage requires pre-planning the procedure to be followed in the course of the flight. It means gathering and studying all the information that the pilot might require to bring his plane to its destination safely. It means anticipating emergency conditions and providing for a safe alternate course of action if the original plan cannot be followed. Should an emergency arise during a flight, such as a change in weather closing in the destined airport, or changing a VFR flight to one under instrument conditions, etc., the pilot may find himself too busy to avail himself of many items of information vital to completing his flight in complete safety.

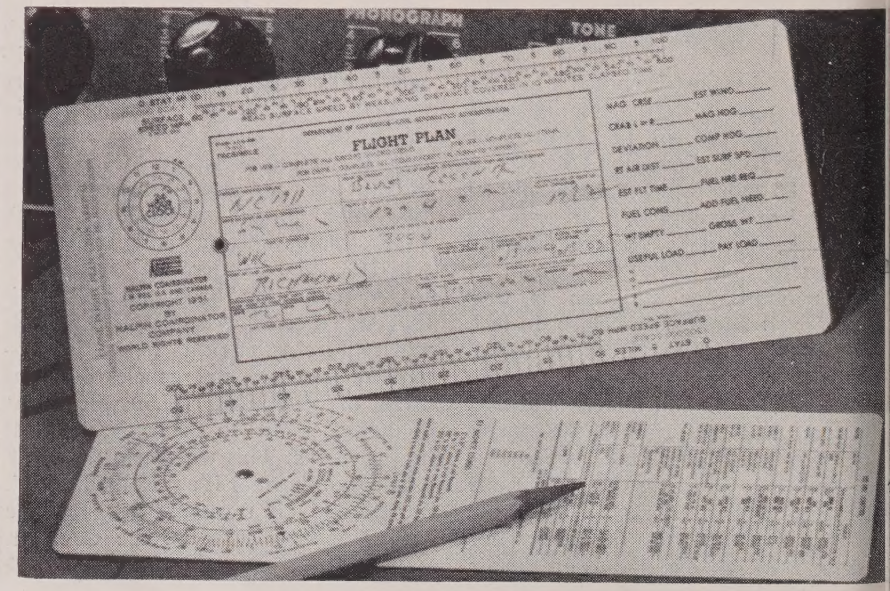
Coairdinator Info ▶ The usefulness of the ***Coairdinator*** begins with information supplied on the stiff holding envelope. On the front are portions of the Civil Air Regulations outlining when VFR and IFR flight plans must be filed, together with an outline of weather information. This includes an easily read glossary of the symbols used on the Airway Weather Code, with a sampl weather sequence as transmitted by tele type. On the back of the envelope i printed the basic VFR flight rules an a simple table of VFR minimums.

The front of the ***Coairdinator*** itsel (shown below) provides a handy form o which the pilot can write in the pert nent information so he can read it at glance when he needs it, with two blan lines at the bottom for special notes suc as radio information, instructions fro Airway Traffic Control, particular land marks, etc. In the center is a facsimil of the CAA Flight Plan form (ACA-398 which may be filled out in pencil prio to clearance—either in person, by radi or by telephone. This provides a simpl method of keeping the filed flight pla near at hand throughout the trip. 24-hour clock (13 to 24 in red) is at th left, with scales for obtaining surface o ground speed at top and bottom.

On the reverse side is a disc-type com puter with inner and outer dials code to a set of printed instructions (*at lowe right in photo*). These include conversio scales for gallons to pounds, nautical t statute miles, Fahrenheit to Centigrade IAS to True, etc. An additional featur is a table of VHF Omni-Range (VOR line of sight distances.

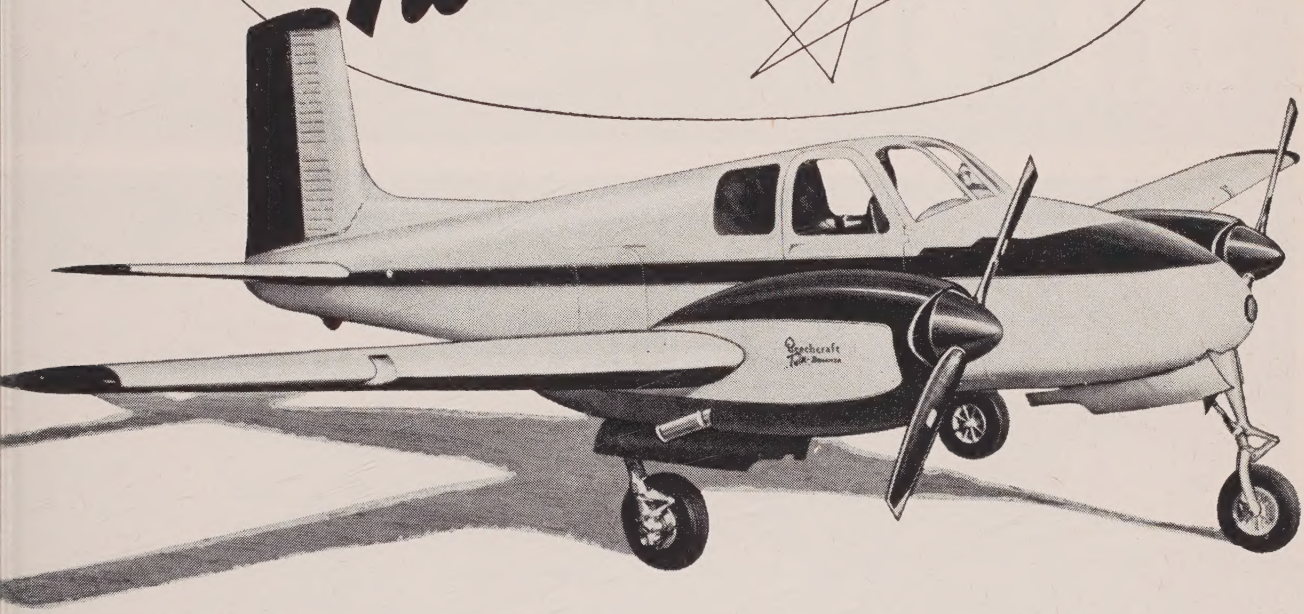
The *Coairdinator* should be valuabl for private pilots as it can be used effe tively from the start. It was designed b Tom Halpin, and represents many yea of flying. It may be obtained for $3.5 from Halpin Coairdinator Co., P.O. Bo 65, Lambert Field 21, Mo.

COAIRDINATOR provides pilots with CAR's, glossary of weather symbols, VFR rules



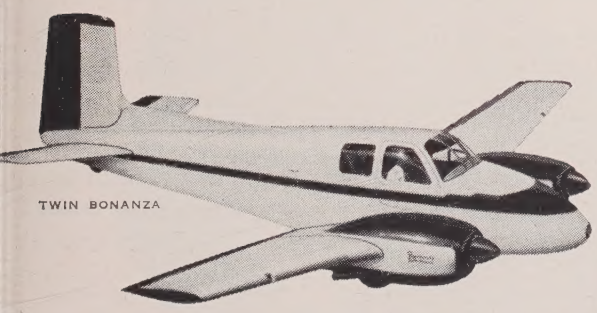
To help America build faster...there's a brilliant new star in the sky...the Beechcraft

Twin-Bonanza



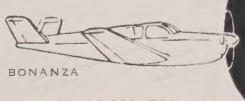
Range, high performance and ruggedness make this newest Beechcraft right for business — and right for military service, too. Designed primarily as a super-roomy, five-place executive plane, capable of seating six for medium-range flights, the Twin-Bonanza is a superb "short-cut" for defense-busy executives. For military use, this *one* plane can serve as a personnel transport, twin-engine trainer, photographic, ambulance or cargo plane — with resulting savings in procurement and maintenance.

The Twin-Bonanza has the ruggedness and safety of its noted Beechcraft predecessors. Structural and operational standards are far in excess of government requirements. Your Beechcraft distributor has detailed information on this new Beechcraft. Check with him today, or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

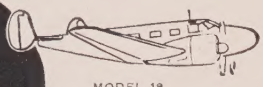


TWIN BONANZA

- Range at 60% power, 1,005 miles
- Top speed at sea level, 200 mph
- Cruising speed at 10,000 ft., 191 mph
- Rate of climb, 1,650 fpm
- Service ceiling, 20,400 ft.



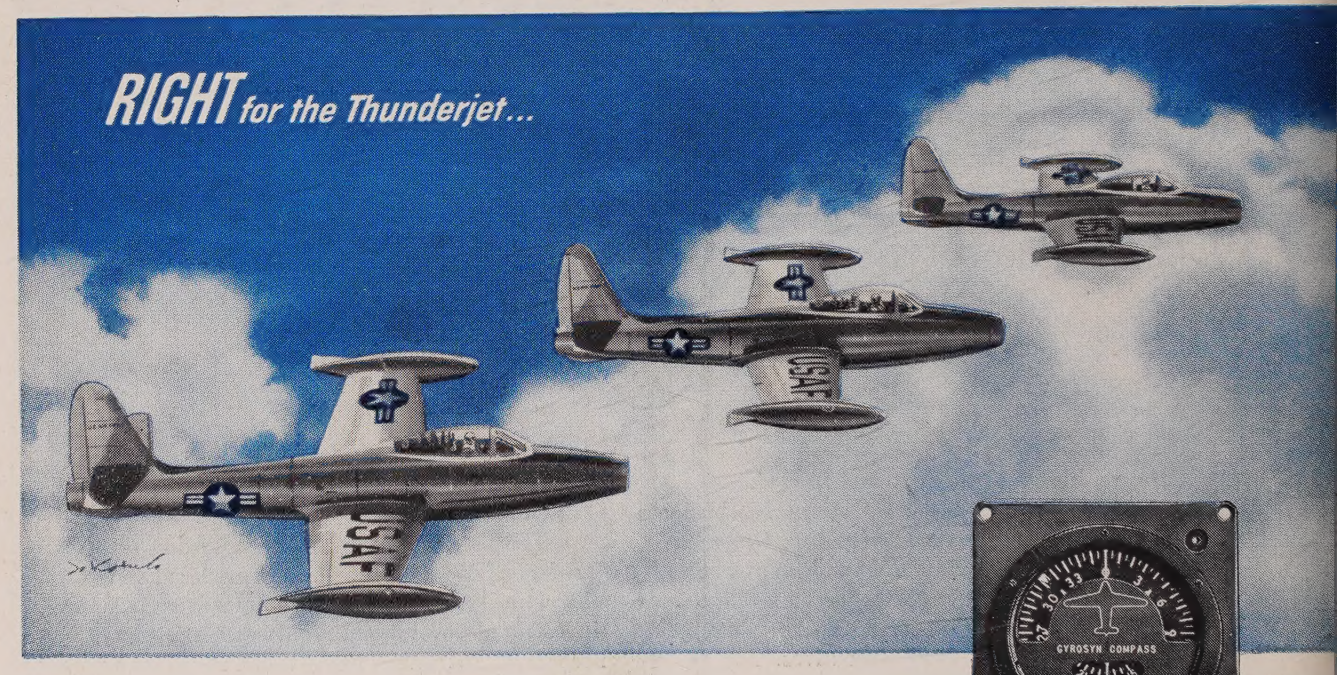
BONANZA



MODEL 18

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



Sperry Gyrosyn Compass

now provides stable directional indications for the U. S. Air Force's Republic *Thunderjet* . . . as it has been doing for other military aircraft. In the commercial field, the DC-6 is one of the many type aircraft on which the Gyrosyn* has proved itself with thousands of hours airline flying time.

► For both commercial and military aircraft the Gyrosyn Compass provides accurate magnetic headings under all flight conditions. A directional gyro synchronized with the earth's magnetic field, it does not oscillate, swing or have northerly turning error. And it requires no resetting.

► No matter what the speed of you aircraft or the air turbulence encoun tered, you can be sure of your headin with the Sperry Gyrosyn Compass.

► Our nearest district office will gladl supply you with complete details.

*TRADE MARK, REG. U. S. PAT. O

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION, GREAT NECK, NEW YORK · CLEVELAND · NEW ORLEANS · NEW YORK · LOS ANGELES · SAN FRANCISCO · SEAT